THE ROLE OF COAL IN A NEW ENERGY AGE

HEARING

BEFORE THE

SELECT COMMITTEE ON ENERGY INDEPENDENCE AND GLOBAL WARMING HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

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HEARING ON THE ROLE OF COAL IN A NEW ENERGY AGE

WEDNESDAY, APRIL 14, 2010

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON ENERGY INDEPENDENCE
AND GLOBAL WARMING,
Washington, DC.

The committee met, pursuant to call, at 9:37 a.m., in room 210, Cannon House Office Building, Hon. Edward J. Markey (chairman of the committee) presiding.

Present: Representatives Markey, Inslee, Cleaver, Salazar, Speier, Sensenbrenner, Shadegg, Sullivan, Blackburn, and Capito.

Staff present: Ana Unruh Cohen, Morgan Gray, and Jonah Steinbuck.

The CHAIRMAN. Good morning and welcome to the Select Committee on Energy Independence and Global Warming. This morning the Select Committee is meeting to assess the present state of the coal industry and to explore how coal can continue to play a role in a new energy age.

Coal was mined in this country before it even was a country. The first 13 States appeared on a United States flag after coal mines appeared on our maps. Coal has helped power America for nearly 300 years. And just like millions of other American families over the years, the Markeys had a close personal relationship with coal. After my grandfather got off the boat from Ireland in 1902, he got a job hauling coal for the Locke Coal Company in Malden, Massachusetts for the next 30 years. And when I was a boy I spent many cold winter mornings shoveling coal into our furnace at home.

Much has changed since those days. We are entering a new energy age, an age in which technology is making it possible to harness energy from the wind, the sun, the atom, shale gases and efficiency measures. Today many Americans are asking if coal is safe enough, if coal is healthy enough, and if coal is innovative enough to be part of our shared clean energy future.

Nine days ago in the Upper Big Branch Mine in West Virginia, 29 miners lost their lives. The incident reminds us that mining coal is a dangerous job performed by courageous people. We owe it to the fallen miners and their families to take a harder look at the entire structure of mining safety, and today our prayers go out to the families of those who lost their lives and to all coal miners.

The public is also concerned about how safe the mining and burning of coal is for our environment and for our health. From the effects of mountaintop removal to air pollution that causes asthma and other health effects to mercury levels that spike near coal fired

power plants and catastrophic releases of fly ash, coal faces a myriad of environmental challenges.

And finally, the burning of coal also releases carbon dioxide, which traps heat and is causing the Earth's temperature to rise. Climate change is a serious problem, and yet some in the coal industry deny that the problem of global warming even exists and have contributed to organizations that spread doubts about science and policy. That has led many to believe the industry is not committed to finding a solution to our pollution problems.

Meanwhile, the challenges from coal's competition are growing. Last year coal's share of America's electricity generation dropped from 49 percent to 44 percent due to increased competition and decreased demand. In 2009, 40 percent of all new electricity capacity built was from wind, roughly the same as natural gas. Meanwhile no new coal plants broke ground.

While the rest of the energy world is already moving to a lower carbon future, people wonder whether the coal industry is stuck in another time.

When Henry Waxman and I were crafting the Waxman-Markey bill that passed the House last June, we worked with several members from coal States to better understand the challenges faced by the coal industry and how to respond to those challenges. That is why we dedicated $60 billion in assistance to the coal industry to help design and build the carbon capture and sequestration plants the industry so desperately needs. And so the question on the future of the coal industry is whether the coal industry and coal burning utilities will embrace innovation, or stand pat and fight change. We have seen this before. The American automotive manufacturers successfully resisted new fuel economy standards, claiming that the technology to turn gas guzzlers into fuel sippers was neither available, affordable, nor preferable. And eventually the folly of their strategy of delay became clear. Consumers abandoned their products and two of the three major American automotive companies received a U.S. Government bailout in order to survive.

Today, with the future of the coal industry in your hands, I challenge you to join us in charting a new path forward to prevent a perilous outcome for your industry and for the planet, and I ask that you cease efforts to deny the science, the global warming, and to stop spending millions of dollars in misleading the public as to the true science behind climate change. I ask that you embrace the provisions of the Waxman-Markey bill that light the way for your industry in the years ahead and that provide your industry with the billions of dollars of financial assistance to help transition to a low carbon economy.

I believe that there is a successful future ahead for the coal industry centered on safer and cleaner practices for your fuel, for your workers, and for the Earth. I look forward to your testimony, and I thank you for coming.

Let me now turn and recognize the ranking member of the committee, the gentleman from Wisconsin, Mr. Sensenbrenner, for an opening statement.

[The prepared statement of Mr. Markey follows:]

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

Opening Statement of Chairman Edward J. Markey (D-Mass.)
April 14, 2010
"The Role of Coal in a New Energy Age"

This morning, the Select Committee is meeting to assess the present state of the coal industry, and explore how coal can continue to play a role in a new energy age.

Coal was mined in this country before it even was a country. The first 13 states appeared on a United States flag after coal mines appeared on our maps. Coal has helped power America for nearly 300 years.

And just like millions of other American families over the years, the Markeys had a close, personal relationship with coal. After my grandfather got off the boat from Ireland in 1902, he got a job hauling coal for the Locke Coal Company in Malden, Massachusetts. And when I was a boy, I spent many cold winter mornings shoveling coal into our furnace at home.

Much has changed since those days. We are entering a new energy age, an age in which technology is making it possible to harness energy from the wind, the sun, the atom, shale gases, and efficiency measures. Today, many Americans are asking if coal is safe enough, if coal is healthy enough, and if coal is innovative enough to be part of our shared clean energy future.

Nine days ago, in the Upper Big Branch Mine in West Virginia, 29 miners lost their lives. The incident reminds us that mining coal is a dangerous job performed by courageous people. We owe it to the fallen miners and their families to take a harder look at the entire structure of mining safety. Today, our prayers go out to the families of those who lost their lives, and to all coal miners.

The public is also concerned about how safe the mining and burning of coal is for our environment and our health. From the effects of mountaintop removal, to air pollution that causes asthma and other health effects, to mercury levels that spike near coal-fired power plants and catastrophic releases of fly ash, coal faces a myriad of environmental challenges.

Finally, the burning of coal also releases carbon dioxide, which traps heat and is causing the Earth's temperature to rise. Climate change is a serious problem, and yet some in the coal industry deny that the problem of global warming even exists and have contributed to organizations that spread doubt about science and policy. That has led many to believe the industry is not committed to finding a solution to our pollution problems.

Meanwhile, the challenges from coal's competition are growing. Last year, coal's share of America's electricity generation dropped from forty-nine percent to forty-four percent due to increased competition and decreased demand.

In 2009, forty percent of all new electricity capacity built was from wind, roughly the same as natural gas. Meanwhile, no new coal plants broke ground. While the rest of the energy world is already moving to a lower-carbon future, people wonder whether the coal industry is stuck in another time.

When Henry Waxman and I were crafting the Waxman-Markey bill that passed the House last June, we worked with several Members from coal states to better understand the challenges faced by the coal industry and how to respond to those challenges. That's why we dedicated $60 billion in assistance to the coal industry to help design and build the carbon capture and sequestration plants the industry so desperately needs.

And so the question on the future of the coal industry is whether the coal industry and coal-burning utilities will embrace innovation or stand pat and fight change?

We've seen this before. The American auto manufacturers successfully resisted new fuel economy standards, claiming that the technology to turn gas guzzlers to fuel sippers was neither available, affordable nor preferable. Eventually, the folly of their strategy of delay became clear. Consumers abandoned their products, and two of the three major American automakers received a U.S. government bailout in order to survive.

Today, with the future of the coal industry in your hands, I challenge you to join us in charting a new path forward to prevent a perilous outcome for your industry and for the planet.

I ask that you cease efforts to deny the science of global warming and stop spending millions of dollars in misleading the public as to the true science behind climate change.

I ask that you embrace the provisions of the Waxman-Markey bill that light the way ahead for your industry and that provide your industry with billions of dollars of financial assistance to help you transition to a low carbon economy.

I believe there is a successful future ahead for the coal industry, centered on safer and cleaner practices for your fuel, for your workers, and for the Earth.

I look forward to your testimony and thank you for coming.

Mr. SENSENBRENNER. Thank you very much, Mr. Chairman. Like most Americans, I believe that there can and should be a proper balance between economic prosperity and environmental sustainability. Everyone wants clean air and clean water and no one wants a sky high electric and tax bill. But cap-and-tax programs don't come close to striking this balance. The huge reliance on offset means that emissions will merely shift overseas, and every study has shown that cap-and-tax will cause increases in utility rates, gas prices, and other economically essential activities.

One statistic from the National Association of Manufacturers demonstrates the greatest danger of cap-and-tax, 3 to 4 million lost jobs. This is not the balance the American people are demanding, especially when nearly 15 million Americans are unemployed.

Coal is the most abundant energy resource in the United States and it generates nearly half of our country's electricity. Coal power plants built today emit 90 percent fewer pollutants like sulfur dioxide, nitrogen oxide, and mercury than plants built in the seventies. Emissions from coal power plants has dropped 40 percent since the seventies, despite the fact that coal use has tripled and the United States has nearly one-third of the world's total coal.

Last week the World Bank approved funding for a new coal fired power plant in South Africa. There was heavy criticism from some environmentalists about this project, but the World Bank officials said that the benefits clearly outweighed the concerns. Faced with frequent blackouts and an aging infrastructure, the South African Government said that the energy reliability of the plant would lift the economy and the standard of living for South Africans.

The U.S. Treasury Department also noticed that there were no near-term viable low carbon energy alternatives for South Africa. Coal is the only resource that could possibly keep this Nation's economy on track. Despite this realization the United States abstained from the World Bank vote.

China is the world's biggest user of coal, burning nearly three times more than the U.S. China is also the world's largest emitter of carbon dioxide, but China is not willing to commit to an international agreement to cut CO_2 emissions.

The administration is trying to sell cap-and-tax on the false premise that it will create so-called green jobs. The President is correct when he says that his proposal to impose higher energy prices on American manufacturers will create jobs, but those jobs won't be green. However, they will be red. As China's reliance on coal continues to grow with the surging economy, cap-and-tax will kill United States manufacturing and ship even more of our precious jobs to China.

It is neither advantageous nor possible to abandon coal, but that is precisely what cap-and-tax proposes to do. The policy is proof that President Obama intends to make good on his campaign promise when he said, "If someone wants to build a coal-fired power plant they can, it is just going to bankrupt them because they are going to be charged a huge sum for all that greenhouse gas that is being emitted."

At least for the foreseeable future the world cannot meet its energy demands without coal, but the new technology can help lessen the environmental impacts of coal use. Researchers continue to ad-

vance carbon capture and storage technology, which holds the potential to drastically cut CO_2 emissions from coal use. The test project at the We Energies power plant in Pleasant Prairie, Wisconsin, last year successfully captured 90 percent of carbon dioxide emissions. As we speak, groundbreaking will begin on another test project in Bucks, Alabama. The 25 megawatt Barry power plant is expected to capture between 100,000 and 150,000 metric tons of carbon dioxide per year. The CO_2 will be transported by pipeline to a site about 10 miles away where it will be injected for permanent underground storage in a deep saline geologic formation. This project will attempt to demonstrate start to finish carbon capture and storage and is one of the most important test projects underway that will advance development of this critical technology.

While carbon capture is part of the energy balance that Americans demand, so are proven technologies like nuclear power and renewable technologies like wind and solar. Americans want a healthy mix of energy technologies that keep the environment clean and the economy humming, and that is why Republicans have always supported an all of the above approach to energy.

I would like to welcome our witnesses today, and I look forward to the testimony of Ohio Coal Association President, Mike Carey, who will tell us more about the importance of coal in his State and for our country and about President Obama's war against coal.

I have to apologize for leaving this hearing, but the Constitution Subcommittee, which I am also the ranking member of, starts at 10 o'clock. So I will read the testimony and I will help defend the Constitution in the meanwhile. So thank you.

The CHAIRMAN. I thank the gentleman very much.

The chair recognizes the gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you. I really appreciate the leadership being here in this industry. I just want to note three headlines that are in the papers in the last week. One 2 days ago a glacier collapsed in Peru, crashed into a lake, caused a tsunami, destroyed 20 homes, and injured 50 people. A third of the glaciers in Peru in the Andes have now disappeared because of climate change.

Second headline, two more glaciers disappeared in Glacier National Park. Glacier National Park will be glacier free within a century if climate change continues unabated.

Third headline, 29 miners lost their lives in the Upper Big Branch Mine in West Virginia. And I think those three stories have something in common, which are the cost of coal without sequestering carbon dioxide.

I appreciate these leaders being here because I want to note another person in the coal industry, Mr. Don Blankenship, who I understood said something to the effect that safety regulators intent to think they are going to protect the safety of miners is "as silly as global warming." A lot of people have lampooned that statement, but it is actually very true. Mining safety is as silly as global warming; they are both deadly serious and they are not silly at all. And we have some leaders here if you decide to join with us to try to find a way to have a policy that will allow coal to be burned in a way that does not put massive amounts of CO_2, does not treat the atmosphere as a garbage dump, it in fact buries it underground

if you will support those efforts. If you will take this lifeline that we have now sent the industry in this bill by sending you billions of dollars to support that research and development, coal can have a future. If you don't, it won't. And we are hopeful that we can have a discussion today about the way you can help us find a way to see if there is a way to sequester CO_2 safely. If not, we are going to go the way these glaciers are and we are going to see more of those headlines.

Thank you.

The CHAIRMAN. The gentleman's time has expired. The chair recognizes the gentlelady from Tennessee, Ms. Blackburn.

Mrs. BLACKBURN. Thank you, Mr. Chairman. I want to join with others who are extending our sympathies and our thoughts to the families that have been affected by the mining disaster in West Virginia. I know my colleague and others are very concerned and are closely working with those affected families.

I also want to thank you for the hearing that we have today and thank the witnesses for being here to testify about the future of coal. We have heard some of the innovative clean coal technologies, the carbon sequestration that is there. These are important to those of us who support the use of coal and are concerned about having the ability to continue to use this natural resource as we look at our Nation's energy supply. We have to realize that domestically produced coal directly employs over 70,000 Americans and it does contribute hundreds of billions of dollars to our national economy each and every year. With vast coal resources, the U.S. has a secure source of energy not subject to foreign embargoes or cartel driven pricing. It is enough for the next 200 years. And Mr. Markey has already highlighted 300 years of use with this product that is right here on American land.

As a chief source of energy coal power contributes significantly to our high standard of living, quality of life, by producing abundant inexpensive heat and power. Certainly those of us in Tennessee are appreciative for the use of coal and realize that we are receiving electricity that is generated by TVA; 40 percent of their capacity is generated by coal.

Since the founding of our republic coal has played a critical importance in our economic and our technological processes, and we are looking forward to how that is going to continue and move forward.

We welcome you and I yield back.

The CHAIRMAN. Great. We thank the gentlelady. The gentleman from the State of Missouri, Mr. Cleaver, is recognized.

Mr. CLEAVER. Thank you, Mr. Chairman. Let me first of all welcome Gregory Boyce and Steven Leer, both of whom are from the State of Missouri. We welcome you to the committee hearing, and then I will also associate myself with the comments of the gentlewoman from Tennessee, Ms. Blackburn, in expressing sympathy with and concern about the people in West Virginia, Mrs. Capito's district. And while I know that there is a great deal of push on what is referred to now as Climategate, that there were those who were hiding data. And then when you add to it the unusual winter we had even here in Washington, there are those, the climate change sceptics who say, you know, this is a big hoax. Although it

is counterintuitive, the truth of the matter is that we have more snowstorms when it is warmer. And we also, I think, should be aware of the fact that the Center for American Progress says that in spite of what happened here in Washington and in areas here on the East Coast, January was the coldest January we have had since records have been kept globally.

And so I think we do have an issue that we need to deal with, and China has 80 percent of its energy supply coming from coal, 40 percent of the U.S. energy comes from coal. It is going to be around for a while, there is no question about it. But just as we look at the tragedy in West Virginia, I think there are some exciting things happening in West Virginia as well that I hope others can look at, particularly even in my own State the American Electric Power's Mountaineer coal plant in West Virginia is doing some remarkable research in terms of being able to direct the CO_2 underground and they hope to have a commercial scale demonstration by 2015. It would be interesting and productive and positive I think for us to discuss the possibility of whether that is exclusively a West Virginia deal that can't be reproduced elsewhere or whether it in fact is something that we can export from West Virginia across the country.

We have some unique problems in the Midwest, but we are a heavily coal using area of the country, and I think that if we all work together facing the reality that the planet is getting warmer, that we do have an increase in the greenhouse gases in our atmosphere, and we can all work together to do something about it.

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

The CHAIRMAN. I thank the gentlemen very much.

The chair recognizes the gentlelady from West Virginia, Ms. Capito, and again we extend the sympathies of the entire committee to your State.

Mrs. CAPITO. Thank you, Mr. Chairman. I thank the witnesses. And as a native born West Virginian I want to thank everybody here and really throughout the Nation who have extended their deep sympathies to us for this latest tragedy. It is gut wrenching and it is really difficult. In a small State we have a great sense of community, and so we all feel it. I appreciate everybody extending their prayers and good wishes to the families.

Last week's mine disaster at Montcoal, at the Upper Big Branch Mine, which killed 29 miners, was the worst mine disaster in 40 years. But just 4 years ago, 12 miners were killed in the Sago Mine in my own district. With this investigation going on and further details that are coming forward, we must continue our commitment to keep miners safe and safety first. We cannot permit this, and we have to prevent this from happening again.

The Upper Big Branch Mine disaster only furthers people's questions of coal mining and has led many to discuss the future of coal. As we have heard today, coal is a primary source of energy throughout the world. Our fast growing countries, and I would be interested to hear the gentleman's testimony on how much they are exporting to China and India, rely on coal to fuel their energy demands. But here in the United States coal is our most abundant domestic resource with recoverable resources sufficient to last 250

years. Coal currently fuels 50 percent of our electricity in this country.

In my State of West Virginia coal power is 98 percent of our electricity. Nationwide it provides 125,000 direct well paid jobs for the U.S. coal miners and supports hundreds of thousands of additional jobs throughout the supply chain.

While considering the future of the coal and the global warming debate, the thing we need to consider and we need to remember is that climate change and energy policies are inextricably linked with economic, environmental, and social issues. Last year the House passed the American Clean Energy and Security Act; I did not support this legislation because I believe it stood to push energy prices upward and threaten an economy that is already in trouble. I also was displeased with the way I felt it set up winners and losers across this country. A tax increase on carbon dioxide emissions will directly come out of consumers' pockets in the form of higher electricity rates. Manufacturing output would also fall considerably. Manufacturing firms, who have traditionally relied on low and stable electric rates in our States, would be subject to massive cost increases, likely forcing them out of business or at least to relocate their operation overseas. We are seeing that now in any case.

Instead, we need to do much more to accelerate the development of advanced clean coal technologies and, most importantly, CCS.

Carbon capture is important to West Virginians in ensuring our Nation's energy independence. Without it we deprive ourselves of the important effective tool for addressing CO_2 emissions from coal. We need to provide sufficient funding and incentives to accelerate the development, demonstration, and broad commercial deployment of CCS technologies.

As my colleague from Missouri mentioned, the AEP plant in New Haven, West Virginia represents a milestone in our efforts to bring CCS on line. That is actually in my district. The facility began operations last fall, captures and stores approximately 100,000 metric tons of CO_2 per year. It is a first demonstration at an existing coal-fired plant. The implementation of this technology will not only benefit a State like mine with jobs in technology and revenue, it will also benefit our Nation by making clean coal a reality.

In addition to climate change, coal has been the subject of continued Federal scrutiny for its impact on water quality. Recent action by the President's administration and the EPA to further scrutinize mining permits only confirms an anti-coal agenda. The minority staff on the Senate Committee on Environmental and Public Works initiated an investigation into EPA's handling of Clean Water Act Section 404 permits for coal mining in Appalachia and found that in 2009 EPA froze 235 coal mining 404 permits, claiming that additional time was needed to assess the environmental impacts of mining operations. Since the initiation of this investigation, EPA issued 45 of the 235 permits. And today there are 190 permits that EPA continues to hold for operations, including surface, underground and refuse operations.

Furthermore, decisions being made by Federal environmental regulators are not focused enough on the importance of coal to the economy. In my conversations with Lisa Jackson, the head of the

EPA, she said that she explicitly omits economic considerations from her decision-making process. I find this particularly troubling. The EPA's delays in handling these permits is already jeopardizing jobs in Appalachia and is weakening our energy security.

Even more disturbing, on March 26, EPA announced their intent to veto the existing Spruce Mine permit. The decision by the EPA to veto the Spruce permit brings into question the reliability of the entire permitting process and shows their complete disregard for the impacts it will have on our Nation's economy and on my State in particular. And I think it reeks of a lack of a sense of fairness.

I look forward to hearing the testimonies from the panel. Thank you.

The CHAIRMAN. The gentlelady's time has expired. The chair recognizes the gentleman from Colorado, Mr. Salazar.

Mr. SALAZAR. Thank you, Mr. Chairman. I do appreciate your having this hearing today. I am pleased to have three of Colorado's largest employers sitting in front of us here today. Arch Coal, Peabody, and Rio Tinto all provide much needed jobs in the Third Congressional District. Thank you very much for what you do for Colorado.

The State of Colorado is home to 407 mining operations, and provides employment for nearly 45,000 Coloradans. Mining jobs in Colorado are high paying jobs, 43 percent higher than the average wage in the State. The average annual wage in the mining industry in Colorado was 65,000 in 2007. Total direct earnings from the State of Colorado's mining payroll were $810 million. Clearly this is a sizable contribution to our State, particularly now at a time when jobs and income are at a premium.

I think we all know that coal is not the only and final answer to energy independence, but we should realize that it must and it will play a valuable role in providing energy to our country, as it is one of America's most abundant natural resources. We must continue to invest financial resources in research and development for all potential clean energy sectors, such as biofuels, solar, wind, algae, and carbon capture and sequestration.

Mr. Chairman, I want to thank you for holding this hearing once again and I think it is vitally important that coal remain a source of energy, but we must do everything that we can to minimize the carbon footprints that many mines and plants may leave behind. I refer to one of your comments in your opening statement where you mentioned that there was over $60 billion provided for the coal industry for clean coal burning technology, I believe. It is my understanding that the bill only secured $4½ billion, but maybe I am mistaken.

Thank you.

The CHAIRMAN. No, I thank the gentleman. The gentleman's time has expired. Inside the Waxman-Markey bill there is $60 billion actually.

Mr. SALAZAR. Sixty billion?

The CHAIRMAN. Yes, at least $60 billion, to be honest with you.

The Chair recognizes the gentleman from Arizona, Mr. Shadegg.

Mr. SHADEGG. Thank you, Mr. Chairman. I request unanimous consent to insert my opening statement into the record and not read it here in full in the interest of time for our hearing.

The CHAIRMAN. Without objection, so ordered.
[The statement of Mr. Shadegg follows:]

Statement of the Honorable John Shadegg
Hearing on Coal
April 14, 2010

- Coal is an important natural resource whose production creates American-made energy and supports well paying American jobs.

- The United States has the largest national coal reserves in the world, representing approximately 28% of global reserves.

- It is America's most abundant energy resource – the country has approximately 270 billion tons of coal reserves, enough coal to last well over 250 years.

- Coal accounts for 44.7% of the electricity generated in the United States and almost two-fifths of Arizona's demand for electricity.

- It is also a cheap energy resource; coal can provide usable energy at a cost of between $1 and $2 per million Btu compared to $6 to $12 per million Btu for oil and natural gas.

- States which rely heavily on coal for electric generation generally have inexpensive electricity.

- We learned very painfully in 2008 how irresponsible policies that lock up our natural resources negatively affect the entire country both economically and in light of national security.

- We must be prudent that we do not, either directly or indirectly, put a moratorium on the abundant and affordable coal resources in this country.

- Unfortunately, due to regulatory uncertainty and environmental opposition, the coal industry has been significantly hindered.

- In 2007, about 13,000 MW of coal generation under development were cancelled.

- It is important that we remove this uncertainty so that we can once again harness the power of coal and I look forward to hearing from our witnesses how to best accomplish this.

Mr. SHADEGG. I do want to thank all of the witnesses for being here and for their testimony today to help us answer what I think is a critically important question. I particularly want to recognize Peabody Energy, which operates in Arizona and produces coal there and provides thousands of jobs in Arizona, as well as Rio Tinto, which does not mine coal in Arizona but does mine copper in Arizona, also contributing to our economy.

With respect to coal, coal is as I think we all know an important natural resource whose production creates many jobs for American workers. The United States has the largest natural coal reserves in the world, representing 28 percent, I believe, of the global reserves. It is America's most abundant energy resource. We have approximately 270 billion tons of coal reserves, enough to last well over 250 years.

How we handle this resource is vitally important. If we mishandle it and impose restrictions on it which drive its costs through the roof or make it unaffordable, then we will all as a nation pay a price. Any tax that we impose on carbon will be passed on to the consumers of the energy that carbon producing fuel produces and will be absorbed by those consumers and do damage to the economic viability of the companies who rely upon it.

Obviously we have a duty to be careful in our conduct and to carefully examine the issue. The questions about global warming need to be examined carefully and thought through thoroughly. David Sokel of Midamerican Energy Holdings testified before the Energy Committee earlier this year that he could meet every single carbon goal in the Waxman-Markey legislation but that by doing it through that legislation we were doubling the cost. It seems to me we cannot do that to our Nation at this particularly difficult and challenging economic time. We need those jobs and we need that energy.

With that, Mr. Chairman, I yield back.

They don't work, they just don't work.

The CHAIRMAN. No, they don't. The Budget Committee——

Mr. SHADEGG. Can't afford mikes.

The CHAIRMAN. Whose hearing room has not properly funded their communications system. We thank the gentleman.

So that completes opening statements from the members.

[The prepared statement of Mr. Sullivan follows:]

April 14, 2010

Opening Statement
Congressman John Sullivan
Select Committee on Energy Independence and Climate Change on
"The Role of Coal in a new Energy Age"

Chairman Markey,

I appreciate you holding this hearing today on the role coal will play in America's energy future.

As a member of the bipartisan Congressional Coal Caucus, I feel that coal will continue to play an important role in electricity generation in the years to come given that 45% of our electricity is currently generated by coal and because we have 28% of the global coal reserves in our nation.

I look forward hearing the witnesses views on the foreseeable economic impacts that EPA's CO2 endangerment finding and pending regulation will have on the domestic coal industry. If allowed to go into effect, this endangerment finding will impose a backdoor energy tax on the

American people by giving the agency unprecedented regulatory authority over almost every foreseeable aspect of our economy, including power generation. This action by EPA could burden thousands of small businesses with unnecessary compliance expenses and higher energy costs, while doing little to protect the environment.

I am also interested in hearing views on how cap and trade legislation currently pending before the Senate will place the United States at a competitive disadvantage as jobs will be lost to overseas competitors in countries like India and China who are not subject to limits on greenhouse gas emissions.

I look forward to hearing the testimony of our witnesses here today and I yield back the balance of my time.

The CHAIRMAN. And to just take a brief moment here, today is the last hearing for our Chief Clerk, Ali Brodsky. She has overseen every single hearing of the Select Committee since its inception, from the top of Cannon Mountain in New Hampshire to today in the Cannon Building. Ali has been our constant. We wish her all the best as she leaves to join Teach for America in Chicago. And as proof of her dedication to the Select Committee, she is flying there tonight and still came here today to oversee and run this last hearing. So, Ali, the committee owes you our thanks for your exemplary public service. Thank you so, so much for everything that you have done.

So now we will turn to our witnesses and we thank them for being here. Our first witness is Mr. Gregory Boyce. Mr. Boyce is the Chairman and Chief Executive Officer of Peabody Energy. Peabody is the world's biggest private sector coal company with customers in 23 countries and six continents. Mr. Boyce joined Peabody in 2003 as President and Chief Operating Officer and has extensive United States and international management operating and engineering experience. We look forward to your testimony, Mr. Boyce. Whenever you feel comfortable, please begin.

STATEMENTS OF GREGORY BOYCE, PRESIDENT AND CEO, PEABODY ENERGY CORPORATION; STEVEN F. LEER, CHAIRMAN AND CEO, ARCH COAL, INC.; PRESTON CHIARO, CHIEF EXECUTIVE FOR ENERGY AND MINERALS, RIO TINTO; AND MICHAEL CAREY, PRESIDENT, OHIO COAL ASSOCIATION

STATEMENT OF GREGORY BOYCE

Mr. BOYCE. Well, good morning, Chairman Markey and distinguished members of the committee. On behalf of all of Peabody employees, we also extend our thought and prayers to the fallen miners in West Virginia.

You have asked me to discuss the role of coal in a new energy age, and it is my privilege to speak to a topic of vital importance to the American people, the U.S. economy, and the world.

I am Chairman and CEO of Peabody Energy, the world largest private sector coal company, a global leader in clean coal solutions and, Mr. Chairman, I also agree that we can provide a safer and cleaner path for coal in the future. My testimony will focus on what I believe are the three top issues we face as a society, energy, the economy, and the environment. We call them the three Es. Coal plays an enormous role in solving each. I will take these one at a time.

Energy security coal is a future fuel to provide clean made-in-America energy and we have the world's largest supply running at our feet.

Economic stimulus, greater deployment of clean coal technology will reindustrialize the U.S. economy to create jobs and infrastructure.

And environmental solutions, coal with carbon capture and storage or green coal is a low cost, low carbon energy solution.

As we contemplate decisions that will affect every American and every global citizen, let me start with the macro view. Mr. Chairman, everyone here today is a member of the so-called "golden bil-

lion." We enjoy a standard of living most only can dream about, thanks in large part to affordable energy. The global population will grow 25 percent to more than 8 billion people by 2030 and the world will need the equivalent power of five more Americas to fuel these needs. This growth occurs at a time when more than half the world's population still lacks adequate access to electricity. So we have the dual challenge of providing electricity to 3.6 billion people who are not properly connected and expanding our infrastructure to another 2 billion who will be people added to the grid.

[Disruption of hearing.]

The CHAIRMAN. We would please ask for—we would please ask for the security officials to restore order in the committee hearing room.

We apologize to you for the interruption and we will recognize you again, Mr. Boyce, and without any time obviously deducted from your oral presentation.

Mr. BOYCE. Thank you, Mr. Chairman. As I was saying, we have an issue of 2 billion people added to our energy grid in the future. How we satisfy this growth with coal is the primary global generation fuel and is expected to grow faster than any other fuels combined in coming decades. Some while others call coal a bridge to the future, I say coal is the future. It powers nearly half of America's electricity at a fraction of the cost of other fuels and Americans enjoy the best quality of life in the world.

Let's move to the economy. We all recognize the jobs is the number 1 priority for the American people. Creative deployment of advanced technologies, including CCS, over the next several decades would create tremendous economic stimulus, reindustrializing our economic base and putting people to work. A 2009 study with the National Coal Council concluded that the deployment of coal with CCS would increase U.S. GDP by $2.7 trillion, create 20 million job years from new construction, and support 800,000 permanent jobs over 40 years. Enhanced oil recovery from CCS would produce additional 2 million barrels of oil per day. So our three E goals are complementary and advance through clean coal technologies which have a strong record of success.

U.S. coal use for electricity generation has more than tripled since 1970, yet criteria emissions have been reduced by 84 percent. Technology can lead us to a lower CO_2 world. Here is the path.

First, build super critical combustion plants with improved efficiencies.

Second, demonstrate carbon capture and storage. We know the technology works. Statoil's Sleipner project in the North Sea has been storing a million tons of CO_2 annually for 15 years.

Third, complete large scale CCS demonstrations.

Fourth, advance coal-to-gas with CCS so the ultimate cost of capturing and storing CO_2 is reduced.

Next, deploy commercial scale IGCC technology with CCS.

And finally, retrofit the world's existing fleet of coal plants with CCS technologies.

A growing number of studies conclude the coal with CCS is the low cost, low carbon solution, 15 to 50 percent less expensive than others. And around the world nations have committed significant

finding for CCS demonstrations, but more funding is needed to bring this technology to commercial scale.

That is a brief view of the essential role of coal and the need for continuous improvement in emissions toward shared goal of near zero emissions. But I would like to close with a look at carbon legislation.

There is a growing recognition in Washington for the vital role that coal plays in providing energy security and affordable electricity for Americans, and we saw this in elements of the Waxman-Markey bill. Achieving our three E goals will require smart, science-based policy to protect the American consumer, worker and family. I say deployable technology should be available before regulation. And we have to take the time to get this right and we have to have the national commitment to get it right.

Now let me emphasize Peabody will support the right kind of legislation which builds on the positives of the Waxman-Markey House bill. It is essential for us to provide a legal and regulatory structure to enable robust development of CCS that assumes Federal responsibility for long-term CO_2 storage, offers timelines for emissions reductions that allow for technology development, eliminates conflicting frameworks at the State and Federal level.

We believe the strong energy bill that advances CCS is best way to achieve both our energy and our environmental goals. The goals are not accomplished by cap-and-trade programs that will result in punishing costs to economies and family budgets. For those who say that a cap-and-trade systems can be cost effective, I don't agree. The only reasonable possibility on this front would be a ceiling of say $12 a ton that Senators Bingaman and Specter advanced several years ago. But here again the only path to meet CO_2 goals is true technology.

I say this after just returning from China, where the Presidents of both our nations have committed to a clean energy path that includes low carbon coal. Peabody is the only non-Chinese equity partner in GreenGen, a near zero emissions power plant that will begin generating power next year. If China can build these type of plants, why can we not here in the U.S.? The U.S. could also be a provider of technology for the rest of the world.

So in conclusion, the real question isn't will we use coal. The U.S. uses more coal than any nation on Earth. We have hundreds of billions of tons of coal in the U.S., trillions of tons in the world, we will use it all. The real question is what is the proper path to move to what the Presidents of both China and the U.S. last year called, "21st century coal." That path is technology first, deployment requirements second as we work together to accelerate the movement to clean coal.

Thank you, Mr. Chairman.

[The statement of Mr. Boyce follows:]

The U.S. House of Representatives
Select Committee for Energy Independence and Global Warming

Testimony of

Gregory H. Boyce
Chairman and Chief Executive Officer
Peabody Energy

Mr. Chairman and distinguished members of the Committee, my name is Gregory Boyce. I am Chairman and Chief Executive Officer of Peabody Energy. I want to thank the Committee for providing this opportunity to offer written testimony on such a vital topic to the future of America and the world.

By way of introduction, let me first share a few words about Peabody Energy. Peabody is headquartered in St. Louis, Mo., but our reach is global. We are the world's largest private-sector coal company[1] and a global leader in clean coal solutions. We fuel 10 percent of U.S. electricity and 2 percent of global power. We shipped nearly a quarter billion tons of coal to customers in 23 countries on six continents last year[2] – nearly 75 pounds of coal for every man, woman and child in the world.[3] We serve nations representing more than half the world's population, and we have access to some of the most rapidly growing markets for electricity, steel and Btu Conversion.[4]

I feel fortunate to have had a long and varied career in the mining and energy industry. I came to Peabody in 2003 as President and Chief Operating Officer and have extensive U.S. and international management, operating and engineering experience. Previously, I served as Chief Executive Officer – Energy for Rio Tinto PLC based in London. My prior positions include President and Chief Executive Officer

[1] SEC filings and Peabody analysis (values on a short-ton basis).
[2] Peabody Form 10-K for the Fiscal Year Ended Dec. 31, 2009.
[3] SEC filings and Peabody analysis (values on a short-ton basis).
[4] Peabody Energy coined the term Btu Conversion to refer to a suite of technologies that convert coal to natural gas or liquid fuels.

of Kennecott Energy Company and President of Kennecott Minerals Company.

I serve as Vice Chairman of the World Coal Institute and the National Mining Association. I am on the Coal Industry Advisory Board of the International Energy Agency and am a member of the boards of directors of the Business Roundtable and the American Coalition for Clean Coal Electricity. I chaired the National Coal Council 2006 study, "Coal: America's Energy Future," which was produced at the request of the U.S. Department of Energy. I also serve on the Board of Directors of Marathon Oil Corporation and the Board of Trustees of Washington University in St. Louis.

My company's market position gives me a valuable perspective on global energy demand and supply trends and their implications. And I can say, without exaggeration, that international energy markets have never been more dynamic, nor the potential for supply shortfalls so serious. Decisions made today will impact the United States and nations around the world for generations.

The Great Recession of 2009 reminds us that affordable energy is the foundation of our fragile economy and the engine of our recovery. Coal is the only sustainable fuel able to meet enormous long-term energy needs. It has been the fastest growing fuel in the world for each of the past six years, increasing 37 percent over that period,[5] and coal is expected to continue this growth into the foreseeable future.[6]

[5] BP Statistical Review of World Energy, June 2009.
[6] International Energy Agency, World Energy Outlook, 2009.

The strongest economic growth engines of the world are in emerging Asia and in nations that are powering their progress with coal. America is also the Saudi Arabia of coal, with more than one-fourth of total global coal reserves.[7] Coal fuels about half of U.S. electricity, at a fraction of the cost of oil and natural gas.[8]

For these reasons and many more, I have often heard coal called a "bridge to the future." To this, I say: Coal is the future. We view coal through the prism of what I call the "Three Es" – energy security; economic progress; and environmental solutions. Energy policy must be crafted to balance all three. And any regulatory process must start with the needs of everyday people.

- Today, I will discuss our energy needs in the context of an emerging global middle class. Rising standards of living around the world will drive immense demand for all commodities and especially for energy.
- Second, I will address the ways in which coal is America's competitive advantage. I will assess the possibilities and limitations of our options to address enormous projected energy needs. In recent years, the world has lurched from the worst energy crisis any of us have seen to the most severe economic crisis in several generations. I would submit that we are now seamlessly moving from the latter back to the former. And all this

[7] Ultimately recoverable demonstrated reserves on Btu basis. Source: USGS, National Assessment of United States Oil and Gas Resources, U.S. Coal Reserves; Energy Information Administration Monthly Energy Review, March 2010 Table 7.2b, 2009 data.
[8] U.S. Energy Information Administration, March 31, 2010.

occurs against a backdrop of ever-increasing environmental expectations. By any objective analysis, greater use of clean coal must be central to any solution. Abundant coal reserves right here in the United States and around the world are sufficient to provide for centuries of low-cost power. We cannot afford to ignore them.

- Third, I will discuss coal's essential role in achieving our climate goals and how technology being advanced today is driving enormous environmental progress. A near-zero emissions future from coal is within reach. I will share our vision for the low-carbon path ahead.
- I will close with the need for technology to be developed and deployed commercially. As policymakers pursue carbon goals, we must provide a realistic basis for determining appropriate limits that do not harm the American consumer, worker and family.

Why Coal: Bringing Electricity to Emerging Nations, Lifting Billions to Better Lives

Mr. Chairman, everyone at the hearing today and every member of your Committee is a member of the so-called "golden billion"; we enjoy a standard of living the rest of the world can only dream about.[9] Yet, as we begin the second decade of the 21st Century, isn't it astounding that more than half the world's population – 3.6 billion people – still lack adequate access to electricity[10]?

[9] International Programs Center, U.S. Census Bureau.
[10] International Energy Agency, World Energy Outlook, 2009; World Coal Institute, "Coal Tackling Poverty," 2007.

Of that total, 1.6 billion – more than five times the population in the United States – have no electricity at all, according to the International Energy Agency and the World Coal Institute. They seek power for the most basic needs: clean drinking water, light and warmth. Coal is the only energy source with the scale and low cost to alleviate energy poverty.

These numbers suggest a different way of thinking about the most basic of environmental challenges. I urge the Committee to look beyond the government halls where caps and carbon are under debate, and enter the huts of the hundreds of millions of people who live in poverty – the people who daily walk miles to gather firewood and waste to burn for the most basic of energy forms. Consider that the World Health Organization says that 2.5 million women and children die prematurely simply from breathing fumes from biomass stoves every year.[11]

Haiti presents a case study in the energy poverty trap. Even before the January earthquake destroyed the Caribbean country, most Haitians had virtually no access to electricity and depended on felling some 50 million trees[12] annually to produce charcoal for fuel. The destruction of Haiti's forests has left much of the countryside barren, leading to a continuing loss in agricultural productivity and leaving this impoverished nation far more vulnerable to flooding. Burning charcoal briquettes also release fumes that hang in a heavy haze over towns like Port-au-Prince and contribute to a host of respiratory illnesses. This is the

[11] World Health Organization, 2007 data.
[12] "Haiti: A ravaged land more bleak," Miami Herald, 2004.

environmental crisis that few discuss. But it is just as real and more compelling than many other environmental challenges. And when it comes to energy poverty, the world has far too many Haitis.

Bringing these families out of severe and direct poverty-driven environmental harm must be priority number one, and electrification through large-scale coal generation is that solution.

A growing collection of studies demonstrate the correlation between electrification and improvement in health, longevity and quality of life. A major study by Daniel Klein and Duke University's Ralph Keeney shows that low-cost electricity from coal saves lives, preventing at least 14,000 to 25,000 premature deaths in the United States each year. Another study by respected epidemiologist M. Harvey Brenner of John Hopkins University concludes that removing coal from the energy mix would result in approximately 150,000 deaths each year in the United States.[13]

The United Nations has linked life expectancy, educational attainment and income with per capita energy use,[14] and the World Resources Institute found that with every tenfold increase in per capita energy use, individuals live 10 years longer.[15]

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[13] "Mortality Reductions from Use of Low-Cost Coal-Fueled Power: An Analytical Framework," Analysis by Daniel E. Klein, Twenty-First Strategies, LLC, McLean, Va., and Ralph L. Keeney, Research Professor, Fuqua School of Business, Duke University, 2002.

[14] United Nations Millennium Goals, International Energy Agency, 2005; Analysis by Dr. Frank Clemente, Pennsylvania State University.

[15] Dr. Mark P. Mills, "Want to Improve Your Nation's Health? Burn Coal," Fueling Our Future, World Climate Report, Vol. 3.

As the Global Energy Institute reported last year: "*Every single one of the United Nation's Millennium Development Goals requires access to electricity as a necessary prerequisite.*"[16]

The good news is that in recent decades hundreds of millions of people around the world have gained access to electric heat and light, refrigerated food and medicine and other necessities. This is in a large part thanks to coal, the world's most sustainable and affordable fuel.

Still, there are billions more who deserve the same high standard of living we enjoy. Global populations are growing at an unprecedented pace, with Asia expanding at rates that dwarf the Western world's industrial revolution. For every child in France, 30 are born in India. Some 600 million people fill China's cities; German cities have 62 million.[17]

In the next quarter century, the population is expected to increase by one-fourth to more than 8 billion people.[18]

Each one of these new citizens will demand modern electricity. So we have the dual challenge of providing electricity to the 3.6 billion people who aren't properly connected, and expanding our infrastructure to another 2 billion people who will be added to the grid.

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[16] Global Energy Institute, 2008, "Out of Poverty: Coal's Contribution to China is a Model for the Developing World," Dr. Frank Clemente, Pennsylvania State University, American Coal Magazine, July 2009.

[17] Analysis of United Nations Population Division, "The World at Six Billion," Dr. Frank Clemente, Pennsylvania State University.

[18] International Programs Center, U.S. Census Bureau, July 2007.

While near-term energy demands are softened by global economic conditions, the long-term outlook remains strong. World energy demand will grow 40 percent in the next quarter century.[19] Let me put this in perspective: The world will demand the electricity equivalent of approximately 150 Californias in just 20 years.[20]

Coal plays an essential role in meeting global energy needs. International coal use is projected to increase 53 percent by 2030... or more than 1.5 times faster than the combined growth rate of oil, natural gas, nuclear and renewables.[21]

The tremendous power of coal to lift people to a higher quality of life is perhaps most evident in Asia. All of us recognize that China and India are leading the world back to black.

Amid the deepest recession in modern memory in 2009, China's economy expanded a robust 8.7 percent, capped by 10.7 percent fourth quarter growth, according to the National Bureau of Statistics. India was close behind with more than 6 percent growth in 2009.[22]

China is on track to become the world's second-largest economy behind the United States and is powering its progress with coal. Since 1980, Chinese GDP has soared 3,400 percent, an "economic miracle" that has been almost entirely fueled by a 316 percent increase in coal use, according to the IEA. India, too, is moving full

[19] International Energy Agency, World Energy Outlook, 2009.
[20] Analysis by Dr. Frank Clemente, Pennsylvania State University.
[21] International Energy Agency, World Energy Outlook, 2009.
[22] The International Monetary Fund, World Economic Outlook, 2009.

throttle and is likely to become the world's fastest-growing coal importer. Together, these nations will account for more than 80 percent of the increase in coal demand and half the world's projected energy growth.[23] Yet, if the Chinese and Indians used as much coal per person as the average American, the world would consume nearly twice as much coal as it does today.[24]

To quote Indian Prime Minister Dr. Manmohan Singh in discussing his nation's growing coal consumption: "*Our vision is not just of economic growth, but also of a growth which would improve the life of the common man.*"[25]

The knowledge that China – not the United States – will be the dominant energy user in the future is not lost on the Chinese. Perhaps that is why China continues to invest in energy technologies on an enormous scale. This single nation is home to 36 percent[26] of the world's most advanced supercritical coal plants, and the People's Republic is just getting started. This fact was brought home to me most recently during a trip to Beijing to participate in a historic signing ceremony for the GreenGen clean coal initiative in the Great Hall of the People. Peabody is the only non-Chinese equity partner in GreenGen, China's signature climate initiative and one of the world's largest commercial-scale, near-zero emissions power projects. I will

[23] International Energy Agency, World Energy Outlook 2008; industry reports and Peabody analysis.
[24] 2007-2008 Human Development Report, United Nations.
[25] Dr. Manmohan Singh, Indian Independence Day speech, 2005.
[26] World Bank, 2008 and Peabody analysis.

discuss GreenGen in greater depth later, but let me simply say that the speed, scale and sophistication of this initiative represent a new reality.

And while Asia's projected energy needs are staggering, more mature economies will continue to demand affordable power to sustain our competitive edge and our modern way of life.

Consider, as a starting point, the fact that every day in the life of the world we use – from all energy sources – the equivalent of 245 million barrels of oil.[27] Demand on that order is undeniable, and it moves in one direction – upward.

Coal's affordability and abundance drive energy security and economic growth, making it a vital fuel for social progress here in the United States and across the globe.

Why Coal: The World's Best Engine for Economic Growth and Energy Security

This brings me to my second topic: Coal's role as the global engine of economic growth and energy security. The recent downturn in the economy has only masked fundamental shifts in global energy markets. The causes of the energy crises of recent years are still with us. Competing resources are still small or strained. What is available is harder to find, more difficult to drill and more expensive to deliver.

[27] Peter Huessy, GeoStrategic Analysis, Potomac, Md., 2009.

Let me describe some of these patterns in greater depth:

First, we are witnessing a resurgence of resource nationalism and protectionism, or the impulse by governments to tightly control domestic resources and exclude foreign investment. Major oil and natural gas supplies are now concentrated in unstable nations that are increasingly willing to use energy supplies for political gain. For example, more than 60 percent of the world's natural gas is held in Russia, Iran and Venezuela.[28] These are the same nations making headlines for pursuing an OPEC-like natural gas cartel to control supply and price. Expanding the ability of a handful of nations to determine the world's energy destiny must be contrary to global energy security.

Second, when it comes to energy, we need it all. Solutions are not "either/or." We do not face a choice between coal or wind. But we need to appreciate both the advantages and limitations of all energy forms.

In that light, it is often instructive to remember the old adage: "*Those who cannot remember the past are condemned to repeat it.*" For instance, much has been said lately about the promise of shale gas discoveries. Little is truly known. We do not know the eventual cost, sustainability, deliverability, reliability and environmental impact of large-scale shale gas production. We do know that the U.S. has a history of

[28] International Energy Agency, World Energy Outlook 2009; media reports.

optimistic production projections and high prices. Here's a bit of history from the past decade:

- In 2000, the U.S. Energy Information Administration (EIA) stated "*production from conventional sources is projected to grow rapidly through 2010.*" Production actually declined in seven of the last eight years.
- In 2005, the American Gas Foundation declared: "*6 trillion cubic feet per year … of liquefied gas is pointed toward U.S. markets.*" We have yet to receive one Tcf.
- In 2008, Michael Stoppard, Director of Gas at Cambridge Energy Research Associates (CERA) claimed: "*The LNG armada has already set sail.*"[29] The lowest amount of Liquefied Natural Gas (LNG) in six years actually arrived.

Natural gas prices have see-sawed wildly in the past decade, and the delivered cost of natural gas in the United States was nearly four times that of coal this past decade ($5.97 per mmBtu for delivered natural gas compared with $1.57 per mmBtu for delivered coal).[30] Worse, the price of natural gas is projected to be five times higher than the price of coal in 2030.[31]

More than 90 percent of the new power plants built in the United States since 2000 depend on natural gas. And almost 50,000 additional

[29] Oil and Gas Journal, Feb. 4, 2008.
[30] U.S. Energy Information Administration, Monthly Energy Review, March 2010 Table 9.10.
[31] U.S. Energy Information Administration, An Updated Annual Energy Outlook, 2009 Reference Case (prices in 2007, $ per MMBtu).

megawatts of gas capacity will be added by 2012. At the same time, the EIA projects that gas supply will decline 4 percent by 2020. All this virtually guarantees challenges even with new shale supplies.

And the situation could get worse: The EIA's 2009 testimony[32] before the Senate suggests that a cap-and-trade regime would place escalating pressure on existing supplies: "*Our results suggest that [Waxman-Markey] would likely increase the use of natural gas for generation over the next decade in all of the scenarios we analyzed...*"

The conclusion is clear: Rapidly growing demand for gas generation elevates and destabilizes prices for all consumer groups, with great risk to the U.S. economy.

Third, other high-profile forms of energy remain too small or too scarce to provide energy at the scale needed to meet growing global needs. It's worth noting that there's no way to store renewable power, which only operates occasionally, so every new wind turbine or solar panel requires backup from conventional generation when the sun is clouded over or the wind doesn't blow. And renewable investments require additional transmission to get that power to market. Perhaps that's why, after 50 years and more than $50 billion in investment, wind and solar comprise just 1 percent of today's U.S. energy mix.[33] Replacing the current U.S. coal generation fleet would require 2,400 times today's

[32] EIA's Analysis of H.R. 2454, the American Clean Energy and Security Act of 2009, Presented to the Senate Energy and Natural Resources Committee, United States Senate, Oct. 14, 2009.
[33] The Congressional Research Service, April 2008.

solar capacity; 40 times the current wind farms currently in place; 250 new nuclear plants or 500 Hoover Dams.[34]

There's a tendency to think of nations in Europe and elsewhere as far ahead of us in renewable fuels. In fact, America has pioneered many green technologies and was the number one producer of wind-generated power and ethanol as recently as 2008.[35]

The sheer scale of our energy needs far exceeds the capacity of any renewable source. Even with the rapid growth of renewables, more than 80 percent of global energy consumed in 2030 will still come from conventional fuels, and only 2 percent of world primary energy is forecast to come from wind and solar, according to the IEA.[36] Simply stated, it is unrealistic to suggest that renewables could replace conventional baseload fuels.

Massive scale… long lead times… tight spare capacity… growing demand… these are the realities we face. A temporary decline in demand hasn't resolved these problems. Our energy challenges have only become more apparent as our recession has eased… from $70-80 per barrel oil to rising coal prices to a forward curve on natural gas that is fairly high by historical standards.[37]

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[34] Financial Times, Sheila McNulty, "Coal-Rich U.S. Puts Faith in CO_2 Storage," Nov. 3 2009.
[35] Global Wind Energy Council, global installed wind power capacity (MW), 2008; World Watch Institute, installed ethanol capacity, 2008.
[36] International Energy Agency, World Energy Outlook 2009, pg. 74.
[37] Rolling 20-day API2, Brent Crude and London Gas prices for six month delivery, Bloomberg.

The American middle class is already feeling these forces, and your constituents are increasingly pinched at the switch. Within the past seven years, energy costs nearly doubled as a percentage of income for families earning less than $50,000. Today, the average middle class family of four spends as much as 20 percent of take-home pay on energy expenses, according to U.S. Department of Energy and U.S. Census data.[38] High costs often force hard choices between energy and other necessities like housing, food, education and health care. A recent national poll on behalf of the National Rural Electric Cooperative Association found that nearly six in 10 Americans say they can't afford an increase in their electricity bills and a monthly increase of as little as $20 would create hardship.[39]

As we chart the course for a sustainable energy future, our most powerful answer, clearly, is coal. The benefit of coal can be summed up by geology and economics. Coal comprises 60 percent of global energy resources.[40] Reserves are large and geographically diverse, from a variety of nations both large and small, developed and emerging, on every major continent. Coal can be easily stored, and coal-fueled electricity is well proven and not weather-dependent. Costs are low. Trade flows are well established. And low-carbon technology is advancing. In the words of the World Coal Institute, *"Coal does not need high-pressure pipelines or dedicated supply routes that need to be protected at enormous expense."*

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[38] U.S. Department of Energy, U.S. Bureau of the Census analysis by American Coalition for Clean Coal Electricity, "Energy Cost Burdens on American Families," Trisko, Feb. 2010.
[39] Lauer Johnson Research commissioned by National Rural Electric Cooperative Association, "Research Findings on Climate Change, Electricity Usage and Cost, and Cap and Trade Auction Legislation," April 20, 2009.
[40] World Coal Supply and Deposition, U.S. Energy Information Administration, 2005.

Coal's versatility only adds to its attraction. New technologies allow coal to be transformed through "Btu Conversion" applications into transportation fuels and natural gas. America's 400-plus coal-fueled plants are the tireless workhorses of our nation's electric generation fleet, producing the most reliable, most cost-competitive baseload power around the clock, in a world of energy shortfalls.

For example, the state of Missouri, home of Peabody's world headquarters, derives more than 80 percent of its electricity from coal and paid a fraction of the energy costs of consumers in other states in 2009.[41] In its most comprehensive study of the state's energy options, the Missouri Public Service Commission has stated: "*Missouri's fleet of coal-fired baseload power plants has contributed to the highly reliable power supply we have in Missouri and our lower than average electric rates compared with other states.*"[42]

Missouri is no sunbelt state; its access to wind resources is limited; and its legislature recently rejected a bill to support a nuclear plant because the cost would be crippling.[43] The state imports 100 percent of its natural gas today.[44] In other words, Missouri's energy situation is typical. Coal offers Missouri's best option to remain competitive in a global economy.

As overwhelming energy demand looms, dozens of nations are planning ahead. About 250 gigawatts of coal-fueled generation are under

[41] U.S. Energy Information Administration, March 2010.
[42] The Missouri Public Service Commission, 2006 report.
[43] Research & Markets, "Financial and Regulatory Instability led to Ameren's Callaway-2 Suspension," May 2009.
[44] Platts data, Peabody analysis, 2009.

construction, representing almost 950 million tonnes per year of incremental coal demand. This is the largest build-out of new coal-fueled electricity in a generation; 85 percent of these new operations are in Asia.[45] Equally impressive, in 2010 alone, 92 gigawatts of coal generation are expected to come on line, requiring nearly 365 million tonnes of coal. At this pace, every three years will bring about more than 1 billion tonnes of coal demand.

These new plants will be key to building low-carbon, high-growth economies, and they drive creation of 4.5 million jobs and $1 trillion in direct economic impacts during construction.[46]

Yet, as Asia builds, America drifts. We continue to depend on our aging fleet and have so far failed to develop a 50-year energy plan for America that utilizes the truly sustainable Three Es as a basic premise.

Let me share just two examples from both coasts that illustrate what could be done on a much larger scale. In Silicon Valley, there's Calera, a startup that is working to commercialize a process that captures CO_2 emissions from coal and locks them into cement. Calera's technology makes coal and cement plants cleaner than solar and wind alternatives. How? By creating low-cost building material using a scalable technology that is not dependent on taxes or subsidies to cut carbon.

[45] Platts Worldwide Power Plant Database and Peabody analysis, 2009.
[46] Data based on study from Adam Rose and Dan Wei, "Economic impacts of coal utilization and displacement from the continental United States, 2015," July 2006.

A demonstration project at Moss Landing, Calif., can capture 30,000 tons of carbon per year. My company just invested $15 million in Calera, so you know we believe in this approach.

Cross the country to Cambridge, Mass., and you'll find GreatPoint Energy, a startup that has devised a remarkably cost-efficient and clean means to convert coal to pipeline-quality natural gas. Peabody is an equity partner in GreatPoint and is evaluating the potential of joint coal-to-gas projects with carbon capture and storage and using Peabody's U.S. reserves.

GreatPoint and Calera demonstrate the entrepreneurial energy and enormous promise that still exists here in America... if we will only tap into it.

America has to ask itself... are we prepared to become a bedroom community for China's high-growth industrial economy? Or are we ready to fuel an industrial rebirth with clean coal... of a magnitude not seen in decades? A great president and son of Massachusetts, John Adams, put it best: "*Facts are stubborn things; and whatever may be our wishes, our inclinations, or the dictates of our passion, they cannot alter the state of facts and evidence.*"[47]

Americans understand this, and despite conflicting signals from Washington, many states are taking steps now to secure their energy futures. Twenty-eight new coal-based generating units are under

[47] John Adams, Library of Congress, 1770.

construction in America. This remains the largest build-out in decades. These new units will require 65 million tons of new coal annually, nearly two-thirds of which will come from either the Powder River Basin in Wyoming or the Illinois Basin in the Midwest.[48] These highly efficient U.S. coal plants will be the first step in any concerted plan to both meet demand and manage our carbon footprint.

The energy, economic and environmental challenges we face are complex and global. And yet, as is so often the case, the most important decisions will be local. If we fail to act, our nation could face a darker future, which unfortunately has been previewed in rising bills and rolling blackouts elsewhere in the world.

How Coal: Our Path to Green Energy

Coal's vital role in energy security and economic stimulus also carries over into environmental progress. It is clear that coal is the only resource capable of meeting our needs. So when the why coal question is answered, the follow-up turns to how. The simple answer is: 'cleanly.'

That's why I like to say black is the new green. It's a statement that surprises some, inspires friends, annoys naysayers, and intrigues the vast majority who hear it. But it also strikes at the core of the case for coal, and for legislation that advances, rather than penalizes, energy innovation.

[48] Platts Worldwide Power Plant Database and Peabody analysis.

Consider that tens of billions of dollars have already been invested by utilities in clean coal technologies to eliminate emissions over the past several decades. While Gross Domestic Product and electricity use from coal have tripled in the United States since 1970, coal's environmental efficiency has dramatically improved, resulting in an 84 percent reduction of regulated emissions per megawatt hour based on an analysis of U.S. Environmental Protection Agency data.[49]

So, we know greater deployment of technology is the solution to achieve our environmental goals. Technologies now under development are changing the color of coal, placing us on a path to achieve the ultimate green goal of near-zero emissions with carbon management.

I call this second phase green coal. I'm describing a virtuous cycle. Coal comes from the earth; it creates clean energy from efficient supercritical, gasification and carbon capture and storage... or CCS... technology; and the carbon is sent into deep storage under the earth... or it pushes up as much as 87 billion barrels[50] of additional oil from U.S. fields alone.

Let me be clear: The world needs more than the "bridge" fuels; we need a 21st Century fuel... and that is coal. Coal is the only sustainable answer with the scale to serve enormous demand and the technology to address carbon goals.

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[49] Peabody analysis of U.S. Environmental Protection Agency, Clean Air Markets database, January 2009.

[50] National Energy Technology Laboratory, U.S. Department of Energy, "Storing CO_2 and Producing Domestic Crude Oil with Next Generation CO_2-EOR Technology," Jan. 9, 2009.

Studies suggest that coal with CCS is that low-cost, low-carbon solution. The European Commission states that the cost of achieving climate goals could be up to 40 percent higher without coal and CCS. The IEA says the cost of meeting CO_2 targets could be $1.3 trillion higher without green coal. And Carnegie Mellon reports that coal with CCS could be 15 to 50 percent less expensive than nuclear, wind or natural gas with CCS.[51]

Natural gas, meanwhile, has been the fastest-growing source of CO_2 this decade in the United States, with carbon emissions from natural gas-fueled generators growing at more than 10 times the pace of coal plants. And natural gas with CCS will be far more expensive than coal with equivalent technology. Let's not again make the mistake of seeking short-term solutions to long-term energy challenges. Coal with CCS is clearly the value investment for our public dollars.

I've discussed carbon capture and storage in concept, but the science of CO_2 capture and storage is concrete and well understood: CO_2 can be separated from the emissions stream and compressed into a liquid state, making it easier and less costly to transport via pipeline. CCS technologies involve injecting CO_2 into aging oil fields to further recover additional oil or deep into saline aquifers or other geology that has stored methane, coal and oil through the millennia.

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[51] Carnegie Mellon University; "Cost and Performance of Fossil Fuel Power Plants with CO_2 Capture and Storage," Energy Policy, 2007; E.S. Rubin, et. al.; "A National Renewable Portfolio Standard? Not Practical," 2008, Issues in Science and Technology, Jay Apt, et. al.; Cost comparisons are based on an integrated gasification combined cycle coal plant with CCS; Natural gas costs reflect the difference between deep CO_2 storage and enhanced oil recovery.

The world has ample room for carbon storage. In the United States, for instance, we could sequester CO_2 for the next century and wouldn't even use up 10 percent of the potential geology that's suitable for storage, based on an analysis by Pacific Northwest National Laboratory. We have, in fact, enough capacity for hundreds of years of storage around the world.

In addition, CCS has been used by the petroleum industry for a half century to increase oil production. Because existing technologies only allow part of the oil in a given reservoir to be recovered, injecting CO_2 into the remaining oil allows greater capture of the "stranded" resource. If the worldwide average oil recovery rate rose just 10 percent through use of CCS, the IEA estimates the increase would be equivalent to new reserves larger than those of Saudi Arabia.[52]

So, I suggest that it is time to stop thinking about carbon only as a cost... and start thinking of it as a competitive advantage. Enhanced oil recovery alone could lead to production of another 2 million barrels of oil per day according to the National Coal Council, a federal advisory committee to the U.S. Secretary of Energy.[53]

We believe there are several crucial steps in advancing the technology.

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[52] International Energy Agency, World Coal Outlook, 2009.
[53] "Low-Carbon Coal: Meeting U.S. Energy, Employment and Carbon Dioxide Emissions Goals with 21st Century Technologies," The National Coal Council, 2010.

Here is the path:

First, build supercritical combustion plants with improved efficiencies, which in the United States typically have CO_2 emissions that are 15 percent below the existing fleet... and more than 40 percent below the oldest of plants being replaced.

Second, demonstrate carbon capture and storage. We know the technology works: Statoil's Sleipner project in the North Sea, for example, has been storing 1 million tons of CO_2 annually for 15 years.

Third, complete large-scale CCS demonstrations: world leaders are increasingly calling for rapid CCS deployment.

Fourth, advance coal-to-gas with CCS. One of the benefits of coal-to-gas technologies is the inherent ability to capture a pure CO_2 stream, so the ultimate cost of capturing and storing CO_2 is reduced.

Next, after we demonstrate these technologies, we can deploy commercial-scale IGCC technology with CCS.

And finally: we can retrofit the world's existing fleet of coal plants with CCS technologies to improve CO_2, just as we've done successfully for many other emissions.

Enormous progress is being made to advance CCS projects. Governments have set aside significant funding for demonstration

plants,[54] and projects are already advancing to a critical mass around the world. American Electric Power's Mountaineer Plant in West Virginia, for instance, will store about 100,000 tons of carbon annually. A few other headlines make my point:

- In the United States, the U.S. Energy Department has pledged $3.4 billion to commercialize CCS and is moving the landmark near-zero emissions FutureGen project through final technical review.
- In Australia, $100 million in annual government funding has been made available for 20 commercial scale projects worldwide by 2020, and the Callide oxyfuel project in Queensland is under construction.
- The United Kingdom's energy plan calls for four CCS demonstration projects to be developed. And just last month, British authorities officially launched the Office of Carbon Capture and Storage to speed the development of CCS initiatives.

Not long ago, I toured the site of GreenGen, a widely recognized global model for clean energy from coal. China's multi-phase 650 megawatt GreenGen power plant would be among the world's largest commercial scale near-zero emission coal plants. Phase 1 of GreenGen is under construction and set to begin generation as early as 2011.

[54] International Energy Agency, "Carbon Dioxide Capture and Storage: A Key Carbon Abatement Option," 2008.

GreenGen also demonstrates that the world's leading coal consuming nation can also be the world's leading clean coal provider. In a joint statement by U.S. President Barack Obama and Chinese President Hu Jintao, the two world leaders recognized the importance of GreenGen.[55] Both leaders cited GreenGen as "21st Century Coal" in the communiqué related to President Obama's visit to China late last year.

Global partnerships and projects like these are essential for securing our energy supplies and achieving our climate goals. Peabody is a leader in clean coal solutions, advancing signature green coal projects and partnerships across three continents.

In Australia, the world's largest coal exporting nation,[56] Peabody is a founding member in the A$100 million Global Carbon Capture and Storage Institute to help channel public and private investment into low-emissions power projects. Australia has multiple near-zero emissions power initiatives through the coal industry's COAL21 program, which Peabody helps fund.

In North America, we are studying technologies to capture and store carbon at the Consortium for Clean Coal Utilization, a new center founded at Washington University in St. Louis that brings together top research universities and government agencies on multiple continents. We're a founding member of the National Carbon Capture Center along with the U.S. Department of Energy. This initiative will

[55] The White House Office of the Press Secretary, U.S.-China Clean Energy Announcements, U.S.-China Cooperation on 21st Century Coal, Nov. 17, 2009.
[56] World Coal Supply and Deposition, U.S. Energy Information Administration, 2005.

accelerate the commercialization of low-carbon and near-zero carbon technologies. Peabody is a founding member of the FutureGen Alliance, a public-private partnership in nearby Mattoon, Ill., to develop a near-zero emissions prototype plant that will store carbon deep under ground on day one of operation. And in nearby Kentucky, Peabody Energy has partnered with ConocoPhillips to advance a state-of-the-art coal-to-gas project... Kentucky NewGas... that will bring gas to three-quarters of a million families. Drilling to evaluate carbon storage geology has already begun, and the project could generate 1,200 jobs at the peak of construction.

Still, much more must be done. U.S. Energy Secretary Steven Chu has wisely issued a call to accelerate global development of carbon capture and storage (CCS) technologies with the goal of broad deployment in as little as eight to 10 years.[57] In recent weeks, the Obama administration has charged a new Clean Coal Task Force of federal agencies with breaking down barriers to developing as many as 10 commercial demonstrations of CCS as quickly as 2016.[58] And the IEA is calling for 100 large-scale, fully deployed CCS plants around the world in the next decade.[59]

We'll need to develop a full fleet of GreenGens, FutureGens and ZeroGens. Yet, in its most recent analysis of carbon capture and storage, the IEA concluded that current spending levels are nowhere

[57] Secretary of Energy Chu: Oct. 12, 2009 Letter to Carbon Sequestration Leadership Forum in London, U.K.
[58] The White House: Office of the Press Secretary, Presidential Memorandum: A Comprehensive Federal Strategy on Carbon Capture and Storage, Feb. 3, 2010.
[59] The New York Times, "IEA Calls for Fast Action on Carbon Storage in Developing World," Oct. 12, 2009.

near enough to achieve deployment goals. I agree. We know that the world will use significantly more coal in the next several decades than it uses today. The question is whether that coal will be used in a low-carbon fashion. Bringing full-scale projects to the finish line is a global challenge and demands a global will.

In the words of former British Prime Minister Tony Blair, "*The vast majority of new power stations in China and India will be coal-fired. Not 'may be coal-fired' – will be. So, developing carbon capture and storage technology is not optional, it is literally of the essence.*"[60]

A Multi-Step Path for Balanced Carbon Legislation

As we contemplate ways to achieve global energy and climate objectives, I urge the Committee to consider that the energy system we have right now is the product of more than 100 years of investment. Supplying the energy needs of the world requires time and money – lots of both. Our responsibility now is to prepare the way for the next century… to set in motion the world's next generation of energy technologies, which will be largely fueled by coal.

There is a growing recognition in Washington for the vital role that coal plays in providing energy security and affordable electricity to Americans. We have also seen major support for carbon capture and storage, which is critical to any realistic carbon management program.

[60] Comments from U.K. Prime Minister Tony Blair, Global Conference on Climate Change in Aspen, Colo., 2008.

Progress will not resemble a sudden turn, but a long arc. And it will require smart, science-based policies to protect the American consumer, worker and family. That's the way America has always targeted emissions reductions, and the best way to deliver energy security, economic growth and environmental progress in the 21st century.

For just these reasons, Senator Lisa Murkowski's amendment to the U.S. Environmental Protection Agency's (EPA) fiscal 2010 spending bill is well timed. The Senator seeks to avoid "the "economic train wreck"[61] that would result from the EPA's precipitous "endangerment funding" under the Clean Air Act. EPA could conceivably regulate hundreds of thousands and perhaps millions of buildings, farms, businesses and other facilities in the United States using legislation that was never intended for this purpose. The Senator calls the approach "one of the least efficient and most damaging ways to pursue that goal. It would be rife with unintended consequences, and could be devastating for our economy." We agree.

We are heartened by the bi-partisan consensus building to allow adequate time for a full and robust debate on sweeping energy legislation. Both Sen. Jay Rockefeller's and Rep. Nick Rahall's bills to delay EPA proceedings by two years seem like a good start. Let's not rush into action on an issue of such vital importance and risk making crucial mistakes.

[61] News release from office of U.S. Senator Lisa Murkowski, "Murkowski Seeks Vote on Amendment on EPA Regulation of Carbon Dioxide," Sept. 23, 2009.

Indeed, it is Peabody's view that too many missteps have already been made with regard to energy and climate goals. Peabody filed a detailed petition citing new information as a basis to urge EPA to reconsider its finding that greenhouse gases endanger human health. EPA had an obligation to render sound judgment and conduct rigorous, peer-reviewed science, but outsourced its scientific analysis to the U.N. Intergovernmental Panel on Climate Change (IPCC). This agency submitted work that has since been shown to be tainted by flaws. Multiple instances of errors, manipulated data and gaps in information make the IPCC's conclusions unreliable. It is clear that the intent of some was to shape a report to satisfy an agenda that is political and not scientific.

Given what we know now about some of the flawed processes and conclusions in the IPCC work, it should be very clear that there is no immediacy to implement regulations that would harm a fragile economy, further suppress investment and raise energy costs for Americans. There *is* ample evidence that climate change is at worst a long-term challenge – not an immediate crisis. There is time to develop low-emissions technologies to maintain economic growth and meet carbon goals. Our focus now should turn from artificial targets and modeled disasters and toward policies that promote solutions.

Draft legislation released by Sens. Jay Rockefeller and George Voinovich is a powerful example of a positive course. The Senators' proposal acknowledges the obvious: Coal will continue to be a

cornerstone of our energy policy, so greater CCS investment, incentives and regulatory certainties are essential.

Here again, the only path to meet CO_2 goals is through technology. So we must continue to advance a business and regulatory framework that enables rapid commercial deployment of near-zero emissions technologies with CCS. I say this after just having returned from China, where the presidents of both of our nations have committed to a clean energy path that includes low-carbon coal.

Peabody is the only non-Chinese equity partner in GreenGen, a near-zero emissions power plant that will begin generating power next year. If China can build these types of plants... why not the United States? The United States could also be a provider of the technology for the rest of the world.

Let me emphasize that Peabody will support the right kind of legislation.

Legislation should build on the positives of the Waxman-Markey House Bill, providing a legal and regulatory structure to enable robust development of CCS that:

- Assumes federal responsibility for CO_2 storage;
- Offers timelines for emissions reductions that allow for technology development; and
- Prohibits duplicative and conflicting frameworks at the state and federal level.

We believe that a strong energy bill that advances CCS is the best way to achieve both our energy and environmental goals. Those goals are not accomplished by cap-and-trade schemes that will result in punishing costs on economies and family budgets. We simply do not believe that a cap-and-trade mechanism can be implemented in a cost effect way. If we are unwilling to guarantee that the cost of managing carbon won't be more than, say, the $12 per tonne of CO_2 that Sens. Bingaman and Specter advanced several years ago, then we should not claim that carbon can be cheaply eliminated from our society.

Increased focus, funding and rules clarification are all needed to address the challenge of carbon. Technology deployment is not as rapid as any of us would like, but delaying the beginning leads to delays in the ultimate commercial success. And storing carbon for enhanced oil recovery provides an even greater payoff for made-in-America energy security and economic gains.

It is no coincidence that the greatest advances in clean coal technology have come in this past quarter-century, a period of incredible economic expansion and investment in energy. To achieve similar success with carbon management, technology must be commercialized to capture and store carbon, and a comprehensive energy roadmap for America with corresponding legislation providing certainty must be created.

I would encourage Congress to apply the same commitment and funding to advance our coal and carbon capture infrastructure that it is using to pass sweeping health care legislation. The result would unleash enormous job creation and energy security.

Shining a Bright Light Forward

Americans understand coal's potential and strongly support greater use of our most plentiful fuel. An October 2009 survey, conducted by Washington, D.C.-based polling firms American Public.us and RT Strategies, found that more than 60 percent of U.S. opinion leaders support the use of coal to generate electricity, up from 45 percent in September 2007.[62]

To this, I would add that, when it comes to energy, every public opinion poll is clear... Americans want answers. They also want to meet our nation's growing energy needs and climate goals from Middle America rather than importing energy from the Middle East.

With focused action today, that future is within reach. Great progress in America and for billions of people around the world hinges on advancing clean and green coal technology right now.

Perhaps President Obama summarized the need for coal best when he said, "*Clean coal technology is something that can make America energy independent. This is America. We figured out how to put a man on the moon in 10 years. You can't tell me we can't figure out how to*

[62] RT Strategies National Omnibus Poll/AmericanPublic.us, Thomas Riehle/Mark Allen, September 2007 - October 2009.

burn coal that we find right here in the United States of America and make it work.[63]"

It is time we recognize the strength of our international economy is linked to our energy choices… and that we have the power to make change. Together, we can harness the greatest power on earth – our own willpower – to achieve our energy, economic and environmental goals through greater use of clean coal.

Mr. Chairman and members of the Committee… coal advances energy security and provides low-cost electricity that powers our economy and helps people live longer and better.

The real question isn't: "Will we use coal?" The U.S. has more coal than any other nation on Earth. We have hundreds of billions of tons of coal in the United States and trillions of tons of coal in the world. And we will use it all. The real question is: "What is the proper path to move to what the presidents of China and the United States last year called "21st Century Coal."

That path is technology first... deployment requirements second… as we work together to accelerate the movement to green coal.

Thank you again for the opportunity to offer testimony to the Committee.

# # #

[63] Remarks by then Senator Barack Obama, Lansing, Mich., Aug. 4, 2008.

The CHAIRMAN. Thank you, Mr. Boyce.

Our next witness is Mr. Steven Leer. He has served as the President and Chief Executive Officer of Arch Coal since 1992. Arch Coal is the Nation's second largest coal company.

We welcome you, Mr. Leer.

STATEMENT OF STEVEN F. LEER

Mr. LEER. Thank you, Chairman Markey, committee members. I appreciate the invitation to offer my views on the role of coal and coal technology in meeting the Nation's clean energy needs and for reducing CO_2 emissions. But first let me echo our prayers and sympathy for the miners and their families that were lost last week in West Virginia.

This committee has an extremely difficult task addressing an extremely complex subject. With this in mind, I am going to focus on four points.

My first point is that coal is being used and will continue to be used around the globe. Coal supplies roughly 23 percent of the U.S. energy needs and roughly 27 percent of the global energy requirements. Global coal use since 2000 has increased more than any other fuel, and that trend is expected to continue. Coal use is growing because it is abundant, widely distributed, and relatively inexpensive. Coal helps billions of people around the world enjoy a higher standard of living than would otherwise be possible. That is the good news.

My second point is the bad new; coal emits more carbon dioxide than other major fuel sources per unit of energy, which bring me to my third point.

We believe technology is the answer. Clean coal technology has solved earlier environmental problems associated with coal use and continues to improve the burning of coal's emissions. Emissions of particulate matter, SO_2 and NO_X, have gone down as previously referenced in several comments. We can be successful in capturing and isolating CO_2 with carbon capture and storage technologies, or CCS. Most elements of CCS have been shown to work in individual elements, but not necessarily at scale or all together, and it is not inexpensive at the moment. DOE and others have developed technology road maps for solving the technological problems associated with CCS and driving down costs. We know where we need to go with CCS and we have identified a path to get there, but I am not saying we are there yet because we are not. But I am convinced that we can get there, first because we have already gotten off to a fairly good start, and second because we really have no other choice if we are serious about and are going to be successful in stabilizing global CO_2 concentrations in the atmosphere.

That is not just my view. In former Prime Minister Tony Blair's assessment of CCS he said, "The vast majority of new power stations in India and China will be coal fired—not may be coal fired, will be—so developing carbon capture and storage technology is not optional, it is literally of the essence."

Remember, China uses three times as much coal as the U.S. and the Chinese use of coal is growing at about 200 million tons every year.

The International Energy Agency found that a scenario which lacked a CCS option was 97 percent more costly than one which included CCS technology. The IAEA has concluded that "CO_2 capture and storage for power generation and industry is the most important single new technology." CCS technology is also a job creator. A report last December by the National Coal Council, a Federal advisory committee to the Secretary of Energy, concluded that CCS deployment through 2050 could produce 28 million job years of construction employment and create 800,000 permanent jobs.

The promise of CCS still has many barriers to overcome. American Electric Power is at the forefront of CCS technology and currently is in the process of scaling up a test facility in West Virginia that will store about 1.5 million tons of CO_2 per year in deep saline formations. Their pilot demonstration plant is built, but we can't say that we have solved all the problems yet, and in reality we have over 2 billion tons of power plant CO_2 to deal with in the U.S., let alone the rest of the world.

My fourth and final point covers the action that we need to take in order for CCS to be commercially available and affordable in a timely manner. One, we need to sharply expand the number of commercial CCS demonstration projects to the 15 to 20 recommended by the NRC.

Two, we need to follow up with continuing financial support for the next 60 gigawatts of generating capacity.

Three, we need to address the legal framework that poses barriers to CCS technology, like the long-term viability of the stored CO_2.

Four, we need to ensure that the policies do no harm or provide disincentives to CCS.

For example, some are proposing that we provide a financial incentive for the deployment of natural gas to displace coal in power plants. I believe this would be a mistake on several fronts. While natural gas emits 50 percent of the CO_2 of coal, it will require CCS to achieve the long-term climate goal. A dash to gas will put CCS development on hold and the technology will not be available when it is needed domestically or globally. Of course the availability of sufficient quantities of natural gas to replace coal particularly at a reasonable price is another question mark.

An alternative approach would be to expand current proposals for Federal renewable electricity standards to include fossil fuel generation with CCS, advanced nuclear power generation, and improved efficiencies at existing power plants.

In closing, let me reiterate my four points. Coal is and will remain an important part of the U.S. and global energy mix, providing benefits to billions of people. Coal's issue is CO_2; the solution is carbon capture and storage technologies. Commercializing CCS in the desired time frame will require industry-government collaboration, significant resources, and an appropriate legal framework. But it can be done. In fact, it must be done if we are going to stabilize global CO_2 concentrations by 2050.

Thank you for your time.

[The statement of Mr. Leer follows:]

Statement of Mr. Steven F. Leer
Chairman and Chief Executive Officer
Arch Coal, Inc.

before the

Select Committee on Energy Independence and Global Warming
United States House of Representatives
April 14, 2010

I thank Chairman Markey, Ranking Member Sensenbrenner and other members of the committee for this opportunity to testify on the role of coal and coal-related technology in meeting the nation's needs for clean energy and for reducing greenhouse gas emissions. Coal and coal-related technologies are at the heart of the Committee's two primary charges: Energy Independence and Global Warming.

I have organized my statement to the Committee into four discussion areas:

- General background material on current and projected coal use and climate implications
- Principles that Arch Coal supports in the development of climate policy
- The role of advanced coal technologies in greenhouse gas emission reductions, especially carbon capture and storage (CCS)
- How the potential of advanced coal technologies can be realized

General background information on coal and coal emissions

Coal is a major contributor to the energy mix in this country, and in the world. Coal contributed 23% of the energy consumed in the U.S. in 2008, and 27% of the energy consumed in the world in 2006 (USDOE/EIA AER-2008). In the U.S., the vast majority of coal consumption is for electric power generation. Coal was used to generate 48.5% of the electricity generated in the U.S. in 2008 (USDOE/EIA AER-2008), and 40% of the global production of electricity in 2005 (International Energy Agency, ETP-2008). The world relies on coal because it is abundant and inexpensive – typically a small fraction of the cost of oil, natural gas, or biomass. The fact that the U.S. relies so heavily on coal is a large part of the reason that, in 2006, U.S. consumers paid about 58% of what Japanese consumers paid for electricity. In France, the U.K., Germany, Italy, and Denmark the fractions were 72%, 56%, 72%, 46%, and 32% (USDOE/EIA website, data compared in US dollars per kilowatthour).

The benefits of coal use to the U.S. economy are substantial. A 2006 report by Dr. Adam Rose (The Economic Impacts of Coal Utilization and Displacement in the Continental United States, 2015) concluded that "in 2015, U.S. coal production, transportation, and consumption for electric power generation will contribute more than $1 trillion of gross

output ... to the economy of the lower-48 United States." Coal and coal-based electricity are clearly key components of our energy mix and our economy.

China is an important player in global coal markets. In 2006, while the U.S. consumed 22 Quadrillion Btu's of coal, 90% for power generation, China consumed 25 Quadrillion Btu's of coal for electricity, and another 24 Quadrillion Btu's in its industrial sector, and a final 3 Quadrillion Btu's in residential and commercial sectors. All told, China burned over twice as much coal as the U.S. in 2006 (USDOE/EIA IEO-2009). More current estimates are that Chinese coal use is now three times that of the U.S., and continues to grow at about 20% of the total U.S. coal consumption rate each year. With China leading the way, non-OECD nations constitute 63% of current world coal use, and are projected by DOE/EIA to contribute 94% of the growth in world coal use between 2006 and 2030 (USDOE/EIA AEO-2009). We have all heard the anecdotes about energy growth in Emerging Asia, and most of them are true. China is building approximately one new coal-based power station every week. China has been adding the equivalent of the entire power grid of the UK each and every year. Chinese car sales exceeded U.S. car sales for the first time ever in 2009.

Consider the prospect of China, which had a private car ownership rate of 4 cars per 1000 people in 1999, compared to about 700 vehicles per 1000 people in the U.S. or 400 vehicles per 1000 people in South Korea, growing in vehicle intensity to just the South Korean rate. That is over 500 million vehicles. If those vehicles are fueled with petroleum, the impact on global oil markets would be very large, not to mention the impact on CO2 emissions. If the sector were dominated by electric vehicles, then the implications for power generation, coal combustion and climate are equally significant, in the absence of effective and affordable CCS technology.

And it's not just China. In fact, coal has been the fastest growing fuel source on the planet this past decade – with global coal consumption up a staggering 41% in just the past eight years. To put U.S. coal consumption into perspective, the U.S. accounts for just one seventh of global coal use today – and that fraction is shrinking rapidly as coal consumption around the world grows, while U.S. consumption remains roughly constant.

So, why is the world turning to coal? Above all, it is because coal is the fuel source that the world's fastest growing economies – China and India in particular, but Russia and Indonesia and most of the rest of the developing world as well – have in greatest abundance. None of their actions support – and I believe it would be naïve of us to think – that such countries will turn their backs on such a vast storehouse of reliable, secure and low-cost energy.

In fact, with competition for energy resources intensifying, such countries are even beginning to look beyond their own borders for fossil energy resources, including coal. During the past year, we have seen state-operated Chinese and Indian companies acquire coal reserves and mines in other countries, with the view of ensuring a sufficient source of energy for the decades to come. Private Chinese, Indian and Russian steel and energy companies are following this same strategy.

Coal's future is not resource-constrained. EIA estimates that the world has 929 billion tons of recoverable coal reserves, enough for about 137 years of production at current rates, and the U.S. has the greatest share of those reserves, about 28% of the global total. By providing affordable heat and power, coal has raised – and is continuing to raise – the standard of living and quality of life for literally billions of people.

Arch Coal takes pride in the fact that we produce about 16% of the coal mined each year in the U.S., providing fuel for about 8% of our national electricity generation. But we also recognize that coal is a major contributor to manmade emissions of greenhouse gases. Arch Coal is committed to playing a constructive role in helping advance federal legislation that both addresses climate concerns and preserves the tremendous economic and human benefits associated with low-cost and secure energy from coal.

Recommended principles to follow in addressing global warming

Arch Coal supports legislation to reduce global greenhouse gas emissions. We believe that this can be done in a manner that maintains U.S. and global prosperity, and that the two most important keys to this are the timing of reductions and a collaborative government/industry effort to commercialize improved, lower cost emission mitigation technologies. I would offer that CCS technologies and their global deployment provide the only technologically feasible and politically achievable path for stabilizing CO2 concentrations in the atmosphere within the next 40 years. We must recognize that even if we could eliminate 100% of the CO2 emissions in the U.S., it would not stabilize CO2 concentrations in the atmosphere. We must develop CCS technologies that can be shared and deployed around the globe.

Our recommended strategy to address global warming includes the following principles:

Provide reasonable targets and timetables. Elements of this principle include recognition that not all the technologies needed to achieve long term goals are available, and will require time to mature and penetrate markets. Also embodied in this principle is the need to establish national policy with a single federal climate program – thus avoiding duplicative or overlapping measures, or a patchwork of state and tort-based activities.

Maintain America's competitiveness in the global economy. This principle goes beyond the basic components of targets and timetables, and includes measures to assure effective cost-containment such as a compliance safety valve or ceiling price for carbon that is certain, reasonable, economically achievable, and consistent with the need to allow time for emerging mitigation technologies to achieve commercial viability before requiring broad deployment. In addition, any program should encourage the expedited development and use of domestic and international offset projects to ensure progress in reducing global emissions at minimal cost.

Foster development and deployment of emerging low-emission technologies. There are a number of these, but for coal and natural gas the key technology is CCS. We must forge

public/private sector partnerships now to invest in carbon capture, transport, storage, and conversion to beneficial uses. We must address the regulatory framework under which such technologies would be structured, including rules for injection and long-term stewardship and liability issues. The timing of reductions and introduction of emission standards must, when considered together with financial incentives, serve to encourage and not frustrate early deployment of the technology.

Promoting improved technologies to reduce emissions from coal

Technology is the solution

It has been stated repeatedly in recent years that there is no silver bullet in addressing the climate challenge. We disagree. We believe that there is in fact a singular solution – albeit a multi-faceted one – and that solution is technology. This concept is not original with Arch Coal; it was well presented in Ending the Energy Stalemate, a December 2004 report by the National Commission on Energy Policy. NCEP concluded, correctly we believe, that current technologies were not up to the task of providing the needed reductions in greenhouse gases, and recommended setting aside a portion of "cap and trade" allowances for technology development. Advanced coal use technologies and carbon capture and storage (CCS) were both explicitly identified by NCEP as important to this technology development concept. Since the NCEP report, most comprehensive climate change mitigation bills have included measures to recycle a portion of compliance revenues to reduce the cost of advanced coal-based technologies, although it should be noted that CCS is applicable to any fossil fuel, and not limited to power production.

Of course, the list of ways in which technology can and should be brought to bear in meeting today's energy challenges is a lengthy one. We need to harness technology to help consumers use power more prudently and cost-effectively; to store energy from intermittent renewable resources such as wind and solar; to boost thermal efficiencies at power plants; and to facilitate the electrification of the automotive fleet, to name just a few. But perhaps most importantly, we must commercialize CCS technology.

The National Research Council, whose members are drawn from the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine, published a seminal report last year, America's Energy Future: Technology and Transformation. This report evaluated "current contributions and the likely future impacts … of existing and new energy technologies." The report recommended a portfolio approach to meeting technology needs in the electricity sector and concluded "two key technologies must be demonstrated during the next decade to allow for their widespread deployment starting around 2020:

- Demonstrate whether CCS technologies … are technically and commercially viable for application to both existing and new power plants. This will require the construction before 2020 of a suite (~15-20) of retrofit and new demonstration plants with CCS …."

- Demonstrate whether evolutionary nuclear plants are commercially viable in the United States ...."

A failure to demonstrate the viability of these technologies during the next decade would greatly restrict options to reduce the electricity sector's CO2 emissions over succeeding decades. The urgency of getting started on these demonstrations to clarify future deployment options cannot be overstated."

In the developed world, we often hear that carbon capture and storage technology will be necessary in order for coal to continue to be used. The background information presented above should make it abundantly clear that nothing could be further from reality. The facts are that the world will continue to use coal, period – massively and in rapidly growing volumes. The question is not whether global coal use will continue and grow, but rather, whether emissions from coal will grow. The answer to that question will hinge on our ability to make CCS technology effective, and just as important, affordable.

The rest of the world has reached the same conclusion. In a recent report entitled Breaking the Climate Deadlock: A Global Deal for Our Low-Carbon Future, Former UK Prime Minister Tony Blair summed it up as follows: "The vast majority of new power stations in China and India will be coal-fired. Not 'may be coal-fired'; will be. So developing carbon capture and storage technology is not optional, it is literally of the essence."

We believe that helping bring CCS technology to maturation would represent an enormous contribution to the global effort to stabilize GHG concentrations in the atmosphere. If we can move the technologies forward and drive down their costs, we can not only address our domestic greenhouse gas emissions more effectively, but also equip the developing world with the kinds of tools that will provide an improved standard of living in a climate-compatible manner.

Furthermore, there is already an excellent technological foundation in place upon which we can build. Virtually every aspect of carbon capture and storage has been proven to work, and many of the key pieces are currently being used at commercial scale. For instance, the U.S. is already injecting millions of tons of carbon dioxide into the ground each year to increase recovery in declining oil fields. Coal gasification – particularly for chemical production but increasingly for power generation – is widely deployed, and provides one avenue for isolating carbon dioxide from fossil fuel prior to combustion. American Electric Power – in what we view as a watershed event – recently began capturing carbon dioxide from a portion of the flue gas of its Mountaineer power plant in West Virginia and is currently injecting it underground for permanent storage. Through a project jointly funded by AEP and DOE, they have already begun planning on a commercial-scale version of the same technology on the same generating unit.

I must emphasize that CCS remains an emerging technology. There is still not a single commercial scale power plant in the world which captures its CO2 and injects it into a

geological formation for permanent storage. The planned project by AEP will inject 1.5 million tonnes per year of CO2 deep underground. Success at Mountaineer will be a major accomplishment, but we must remember that individual coal-fired generating units in the U.S. often emit over 6 million tonnes per year of CO2 – four times the rate to be captured by the Mountaineer demonstration project. As noted above, coal-fired power plants in the U.S. cumulatively emit over 2000 million tonnes of CO2 per year, so the scale of the challenge is large. Moreover, the current technology options are all quite costly, and there are aspects of the process which go beyond our current legal infrastructure, such as addressing long-term stewardship and liability for stored CO2.

Benefits of CCS

CCS technology offers three distinct types of benefits. The first, and most obvious, is that for the types of aggressive emission reduction goals that are currently being projected, it can greatly reduce compliance costs. The second is a corollary benefit: that by reducing costs, CCS enables society to seek larger overall emission reductions. It should be noted that these first two benefits are associated with all fossil fuels used with large stationary sources, not just coal. The third type of benefit is that by making an abundant low cost energy resource compatible with environmental goals, CCS allows the world to continue to derive the economic and geopolitically stabilizing benefits associated with coal.

The International Energy Agency, in Energy Technology Perspectives – 2008, a report prepared to support the G8 Plan of Action on climate change, stated **"CO2 capture and storage for power generation and industry is the most important single new technology ...."** In IEA's modeling, CCS accounted for 19% of global CO2 reductions. Perhaps just as important, IEA evaluated multiple scenarios, and the cost of climate mitigation in a world *without* CCS was 97% more expensive than a scenario in which CCS was assumed to be demonstrated and affordable.

CCS technology is important because the electric power sector is crucial to meeting climate change goals, and because coal dominates U.S. and global power generation. The DOE/EIA analysis of H.R. 2454 concluded that "The vast majority of reductions in energy-related emissions are expected to occur in the electric power sector." For the main scenarios evaluated by EIA, the power sector contributed 80-88% of such reductions. EPA's analyses project that U.S. electricity prices, which averaged about 10 cents per killowatthour for residential customers in 2007, will increase about 80% (in constant dollars) by 2050 under HR. 2454, and by nearly 100% if critical power technologies, including CCS, are unavailable. (EPA did not evaluate the impact on electricity prices of substantial reductions in the cost of CCS.) Hence, CCS technology is crucial to both achieving targeted emission limits, and for making the global warming mitigation program affordable.

In February 2009, BBC Research and Consulting conducted a study for four major labor unions and the American Coalition for Clean Coal Electricity. The study examined the micro-economic and employment effects of deploying CCS technology on just one-fourth

of the U.S. coal-based generation fleet. Effects evaluated included the economic activity associated with the construction and operation of the power plants with CCS, the suppliers and support services industry for those units, and "induced effects" – the jobs created by purchases by employees in the first two categories such as for homes, automobiles, and groceries. BBC concluded that this initial CCS deployment would result in 5.5 – 7.0 million job-years, and after the massive ($300-400 billion) construction period was concluded, 175,000 to 250,000 permanent jobs to operate the technology.

BBC did not include an analysis of the job impacts of further research to drive down CCS costs, making electricity less costly than otherwise, and thereby improving American competitiveness in global markets. Neither did it consider the beneficial impact on capital markets of being able to retrofit existing power plants with CCS, rather than replace them with new power plants using other technologies, such as nuclear energy. Of course, reduced demand for energy capital means more capital is available for other job-producing investments. Such "macro-economic" benefits could greatly exceed the direct employment impacts. One could argue that if CCS achieved its ultimate goal of both domestic and international deployment, then that American advantage would be lost. However, there is a more persuasive argument that such success would yield even greater benefits in resolving the global climate problem, and in providing greater prosperity for all through a global reduction in basic energy costs.

The National Coal Council, an official Federal Advisory Committee to the Secretary of Energy, took a longer view on the benefits of CCS in its December 2009 report, Low-Carbon Coal: Meeting U.S. Energy, Employment and CO2 Emission Goals with 21st Century Technologies. The report concluded that "Extensive deployment [through 2050] of coal-based generation with CCS will have far-reaching socioeconomic benefits, yielding **over 28 million job-years** from new construction and revitalizing the industrial sector of the U.S. GDP will be increased by **$2.7 trillion**. Further, continuing operation and maintenance of the facilities would support over **800,000 permanent jobs**." [emphasis in original]

One might believe that *any* of the emerging "green" technologies would reduce mitigation costs and create jobs in America. However, not all technologies are created equal, and the current existing generating base and energy infrastructure provide an inherent advantage to some technologies. Whereas wind turbines and solar systems can easily be imported from overseas, the U.S. clearly has the global lead in CCS technology. And the coal and most of the natural gas that fuels CCS-equipped power plants in the U.S. will be produced in the U.S. – with obvious security of supply implications – helping our economy and providing domestic employment.

A final benefit of CCS technology, generally missing from current analyses, is its ability to reduce emissions from the transportation sector. If you carefully examine EPA's analysis of H.R. 2454, you will find that petroleum use remains relatively constant through 2050. While we seek an 83% reduction in greenhouse gas emissions, in the face of a growing population and increasing prosperity, the best that improvements in mileage can provide is the ability to stay even with current emissions. Electric vehicles could

disrupt this environmental stagnation, both domestically and globally. But the increased consumption of electricity to displace oil used in the transportation sector must come from additional generating capacity. Multiple sources will be needed, and coal with CCS is certainly capable of contributing in a significant way. Success in substituting electricity for oil conveys benefits that go beyond mitigation of global warming. It is easy to see that the rise of Asian economies will place ever increasing pressure on limited supplies of crude oil and transportation fuels, often produced by countries that do not like us. The potential for CCS to relieve some of that pressure should not be casually overlooked.

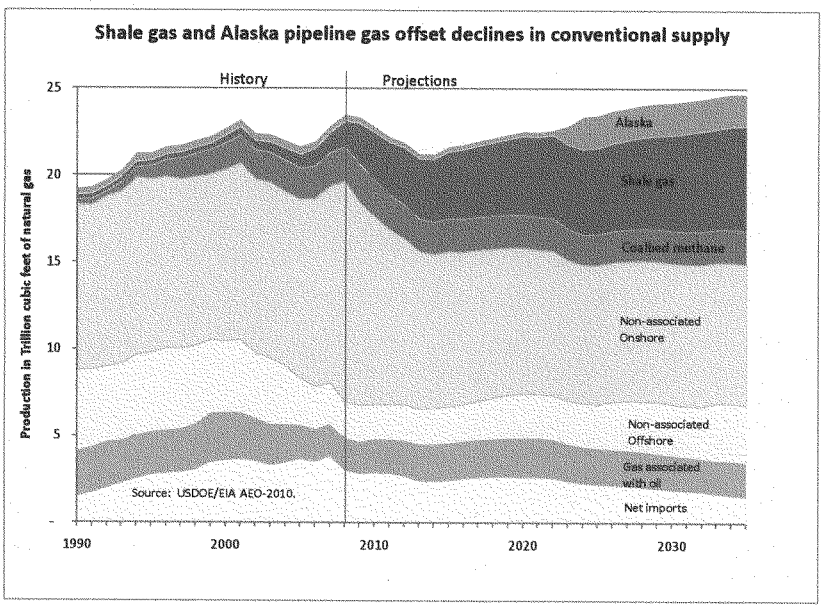
Realizing the potential

So, how should we proceed? Based on the principles articulated above, Arch believes that near- and mid-term targets should be harmonized with technology availability, which suggests a more modest target in 2020. Moreover, we believe it is imperative that we put in place cost containment mechanisms that provide greater certainty. We applaud Chairman Waxman and Chairman Markey for allowing the expansive use of offsets in meeting compliance targets – although we would have preferred fewer restrictions and limitations on those offsets. But we remain very concerned that the projected offsets market would prove to be far less robust and liquid than currently envisioned. If that proves to be the case, the cost of compliance would likely increase dramatically, as the EPA analysis suggests.

Timing is crucial. One of the greatest dangers to affordable long-term solutions is that overly aggressive near-term targets would prompt power generators to look for a short-term fix by turning to more expensive but lower-carbon fuels such as natural gas. We have been down that path before – in the first years of this decade – and the result was higher power costs and lower reliability. The National Academies of Science just released a report on America's Energy Future in which they cautioned against just such thinking. In the end, to reach the goals in recent legislative proposals and supported by various studies, we will need to apply CCS to natural gas-based power systems as well as coal-based power systems. A sudden "dash to gas" would likely eliminate interest in longer-term application of CCS, and the technology would freeze in its current state of development. All this brings me back to the key point, which is that without robust CCS technologies we cannot stabilize CO2 concentrations in the atmosphere within the next 40 years.

Moreover, we believe that the jury remains out regarding future gas supplies. We have read recent reports heralding large new supplies of unconventional "shale" gas. But we have also read the DOE/EIA 2010 Annual Energy Outlook. The figure below, taken from that report, shows that unconventional gas production is, indeed, projected to increase over the next two decades. The figure also shows that EIA believes *conventional* natural gas production is going to decline at about the same rate as the increase in *unconventional* shale production. The net projected increase, after 20 years, is only 2 quadrillion Btu's of gas above the rate produced before the current recession, about 9% of the energy currently associated with coal-based power production. So even

if all of this additional gas went to power production, which currently consumes about one-third of total U.S. natural gas consumption, it would not make a major change in coal use.



With respect to CCS, Arch believes that this technology is essential to meeting climate goals, and to assuring an affordable solution. We would encourage Congress to take the steps necessary to work with industry to accelerate the timeline for widescale deployment of this crucial technology.

Arch supports the underpinning pro-technology philosophy of the 2004 NCEP report, and most comprehensive climate bills proposed since then, and recommends:

- A substantial government/private sector collaborative effort to construct a significant number of power plants using CCS with saline geologic storage to demonstrate a portfolio of CCS technologies, and
- Continuing R&D and further cost-sharing by government on a large initial deployment of CCS facilities, on both new and existing fossil fuel based power plants, and
- Creation of a legal framework for CCS that overcomes recognized *non-technology* barriers to the technology, including certainty in the environmental rules that apply to CCS and long-term liability.

Elements of the above concepts can be found in HR. 2454, but perhaps the most complete CCS legislative proposal to date is found in a draft bill released on March 22 by Senators Rockefeller and Voinovich. This discussion draft includes:

- Continued government support for the DOE CCS research and development program.
- A CCS "Pioneer" program to supplement the DOE CCS demonstration program, with an immediate effort to demonstrate 20 GW of CCS systems. Private sector costs for these units would be supplemented by a "wires charge" placed on sale of fossil-based electric power, by federal loan guarantees, and by tax incentives.
- An "Early Adopter" program to provide tax incentives to foster deployment of another 62 GW of CCS systems.
- A performance standard that would require all new coal-based power plants to use CCS technology, once the above programs have demonstrated that the technology is effective and reliable.
- A placeholder for future language addressing the long-term liability issue.

Arch is optimistic about the Rockefeller-Voinovich package because it could move forward immediately. We should not squander valuable time needed to advance this critical technology.

An alternative approach to greatly increase the number of CCS demonstration facilities in the short term and reduce the amount of CO2 released per unit of energy consumed would be to expand current legislative proposals for a federal renewable electricity standard to include other clean electricity options: specifically, fossil fuel generation with CCS, advanced nuclear power generation, and improved efficiency at existing power generation facilities. This broadening of the RES was rejected by the Senate Energy Committee, but Arch continues to believe that it would be a pragmatic mechanism to establish a portfolio of improved low carbon options from which new generation markets could choose.

These recommendations constitute a pragmatic action plan to achieve aggressive environmental goals, both domestically and globally, without sacrificing economic prosperity. The proposals outlined above would allow the nation to begin building CCS systems at a pace that would otherwise be unachievable. Industry has repeatedly demonstrated its support for this technology-based solution to global warming, but we need to see shared determination and support from the federal government to get the job done.

The CHAIRMAN. Thank you, Mr. Leer. Our next witness is Mr. Mike Carey. Mr. Carey is the President of the Ohio Coal Association. He has a diverse background that includes military service and legislative relations in both the energy and natural resource industries.

We welcome you, sir.

STATEMENT OF MICHAEL CAREY

Mr. CAREY. Thank you, Chairman Markey, members of the committee. My name is Mike Carey, President of the Ohio Coal Association, border State to West Virginia, and our prayers are with the families there as well.

I would like to take a moment to thank my fellow witnesses both from Arch Coal and Peabody Energy for their continued commitment to the American coal industry. However, I must point out at this time that Rio Tinto has been divesting themselves of domestic coal reserves for many years. I do not believe they represent the future of coal in America.

Given the high levels of recoverable coal reserves and increasing demand for energy, especially in developing nations where low cost electricity is essential, coal's future global success is assured. However, coal mining and use in the United States is severely jeopardized by the war on coal waged through the legislative process and the unprecedented regulatory actions. But in the rest of the world our competitors are investing in coal to make them more competitive and to steal our jobs. China alone continues to build a new power plant about every week.

I would like to leave you with three main points. First, the Obama administration's regulatory assault on energy production and the war on coal in particular is creating a de facto Obama energy tax on all American families.

Second, the CCS provisions in the Waxman-Markey bill and other climate proposals encourage massive fuel switching to more expensive natural gas before the CCS technology can be deployed. But even then the lack of regulatory legal frameworks will prevent commercial deployment of the technology.

And despite the recent tragedy in West Virginia, the U.S. coal mining industry has the best safety record in the world.

The role of coal in the new energy age is greatly hampered by the regulatory assault waged by the Obama administration and in particular the Environmental Protection Agency. While President Obama may not directly raise taxes, his administration is implementing the Obama energy tax on all American families by administrative fiat. We are in the process of calculating how much this will cost the American families in higher energy bills.

The chart that you see behind me lists a number of the proposals, final, planned regulatory assaults on the coal industry, and I will briefly highlight a couple of them. The Ohio Coal Association is challenging the endangerment finding in court. We believe that the science that is underpinning the endangerment finding is questionable and that the EPA did not include required parts of economic analysis. According to the EPA, they relied substantially on the IPCC and the data which is at the heart of the Climategate scandal. Only 52 scientists signed the U.N. IPCC fourth assess-

ment report, and it is cited in the endangerment finding an astounding 49 times and 395 in the technical supporting documents.

Next, we have seen the Clean Water Act used inappropriately in many ways to hamper the production and use of coal, such as the use of the clean water guidelines on surface mining permits issued just last month which would basically put a moratorium on mining in Appalachia. The Clean Water Act veto of an existing Army Corps of Engineers permit is unprecedented. The Waxman-Markey CCS provisions are an attempt to persuade the coal industry to support the cap and tax.

The bill, according to my numbers, allocates $10 billion towards CCS but misses the mark in two regards. The first is timing. The legislation requires emission reductions starting in 2012. The restrictive performance standards on coal-fired power plants in 2020, ignoring what the developers of the CCS technology have been saying for years, which will take 15 to 20 years before commercial development. The United States Congress simply cannot dictate a timeline of technological developments.

Secondly, the bill calls merely for a study to report back to Congress with recommendations on issues such as CCS liability, permitting and other environmental considerations. CRS and GAO have already provided information on liability and permitting problems and the need to address for CCS to work.

The way the CCS program and the Waxman-Markey bill is structured actually encourage massive fuel switching to more expensive natural gas before the CCS technology can actually be deployed. But even then, the lack of regulatory legal liability frameworks will prevent commercial deployment of the technology.

In conclusion, domestic coal production needs the support of Congress in this administration. Despite the recent events in West Virginia, the U.S. coal mining industry has the best safety record in the world. Mine Safety and Health Administration data showed there were 18 coal mining fatalities last year amongst 133,000 coal miners, an improvement of up to 63 percent over the numbers 3 years before. By contrast, the BBC estimates that 13 Chinese coal miners die every day in their coal mines. Our safety record is largely due to our combined national and State efforts to encourage innovative and safety practices. The Ohio Coal Association recently collaborated with the Ohio legislative process legislature and worked to pass a new mine safety bill in our State even though we had not had a mine fatality in 5 years.

I want to thank you for the opportunity to testify, and I look forward to answering any of the questions you may have.

[The statement of Mr. Carey follows:]

Testimony of Mike Carey
President, Ohio Coal Association
Select Committee on Energy Independence & Global Warming
The Role of Coal in the New Energy Age
April 14, 2010

Chairman Markey, Ranking Member Sensenbrenner, and Members of the Committee, thank you for inviting me to testify today at this very important hearing on the Role of Coal in the New Energy Age. My name is Mike Carey and I am President of the Ohio Coal Association. In addition, I also serve on the National Coal Council, an advisory Committee for the Secretary of Energy on coal issues.

I'd like to take a moment to thank my fellow witnesses from Arch Coal and Peabody Energy for their continued commitment to coal. Working with these two organizations through various initiatives and trade groups is always a pleasure.

Rio Tinto, on the other hand, has been divesting themselves of their domestic coal operations for years now and I don't believe they represent the future of our coal industry, although they probably represent the desired outcome of the Obama Administration's coal policies.

Given high levels of recoverable coal reserves and an increasing demand for energy, especially in developing nations where low-cost electricity is essential, coal's future global success is assured. However, coal mining and use in the United States is severely jeopardized by a war on coal waged through the legislative process and unprecedented regulatory actions. Our nation has been a leader in coal production, cleanliness and safety – all of which is threatened by actions in the name of climate change.

I. Coal Reserves

With 826 billion tons of proven, recoverable coal reserves worldwide, humanity has enough coal to last the world over 130 years at current rates of production and consumption.[1] Seventy countries have access to recoverable coal reserves, and many of these are emerging market economies desperate for cheap, consistent baseload energy.

In the United States, Energy Information Administration (EIA) data shows at least 261.5 billion tons of reserves recoverable using existing mining techniques and an additional of 226.1 billion tons in our demonstrated reserve base. Our recoverable reserves are almost 1/3 of the world's total supply – we have more coal than Saudi has oil and gas.[2]

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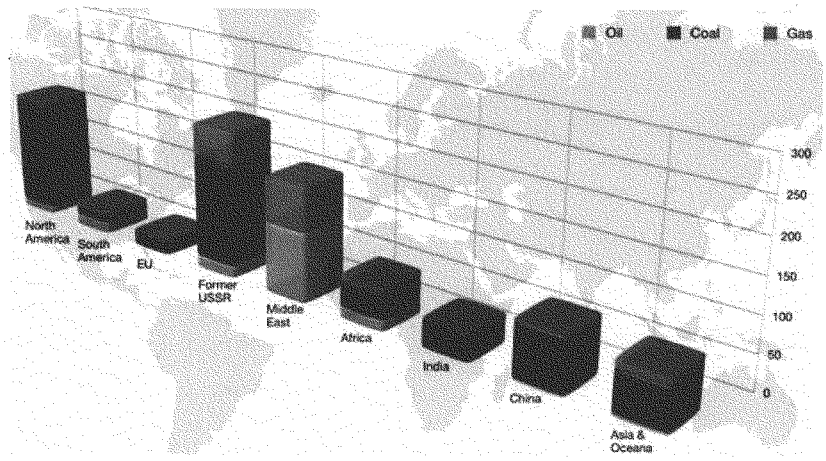
[1] Energy Information Administration: http://www.eia.doe.gov/fuelcoal.html

[2] "BP Statistical Review of World Energy: June 2009." BP Statistical Review of World Energy. BP, June 2009. <http://www.bp.com/statisticalreview>. The United States has 28.9% of the world's proved coal reserves. By contrast, Saudi Arabia has 21% of the total oil and 4.1% of natural gas. Coal is more abundant; the energy produced by our share of coal is significantly greater than Saudi Arabia's oil and gas.



Source: World Coal Institute

II. Increasing Energy Demand

According to the EIA and International Energy Agency, global energy demand is expected to rise 44% over the next twenty years, most of which will be in developing nations.

- In 2006, the Organization for Economic Co-operation and Development (OECD) countries accounted for 51% of global energy consumption.
- OECD countries' energy consumption will drop to 41% of total global energy consumption by 2030.

The five largest users of coal – China, USA, India, Japan and Russia – account for 72% of global coal use.[3] I'd like to focus on two of these countries for a brief minute, as they have both summarily rejected the idea of binding carbon emissions reductions and the phasing-out of coal use. Instead, both China and India have called for reductions in per capita carbon intensity, an admission that their carbon dioxide emissions will undoubtedly increase as their population rapidly expands. U.S. domestic climate legislation attempting to mitigate the global atmospheric concentrations of carbon dioxide will undoubtedly fail as a result.

Here are some select statistics on projected energy demand in relation to coal:

- China has 115 billion tons of recoverable coal reserves, less than 14% of the world's total.
  - Chinese coal production increased 10% in 2008 to 1.414 billion tons.
  - Chinese coal consumption increased 6.8% in 2008 to 1.406 billion tons.
- India has 59 billion tons of recoverable coal reserves, about 7% of the world's total.
  - Indian coal production increased 7% in 2008 to 194.3 million tons.
  - Indian coal consumption increased 8.4% in 2008 to 231.4 million tons.

[3] http://www.worldcoal.org/coal/uses-of-coal/

- China and India accounted for 10% of the world's total energy consumption in 1990, but in 2006 their combined share grew to 19%.
    - Their energy demands are expected to grow to 28% of the total world energy consumption in 2030.
- The U.S. consumed 21% of the world's energy in 2006.
    - By 2030, U.S. energy demand will only comprise 17% of the world's total.
- Coal has been the fastest-growing fuel source for the past 6 years.
    - From 2007 to 2008, coal consumption increased 3.1%.
    - Coal use is expected to increase by an average 1.7% per year until 2030, accounting for 28% of the total world energy consumption in 2030.

China and India have neither enough domestic oil nor natural gas to power their nations for more than a few months. With no other domestic resource able to provide substantial baseload generation, coal figures prominently into these highly-populated nations' strategic energy plans. They have the opportunity to prevent a reliance on foreign energy sources, and they are seizing the moment by investing in coal. China is constructing a new coal-fired power plant every week, fueled by coal produced in an increasing number of domestic mines. In 2008, China produced more coal than it consumed for the first time. While India's expansion isn't nearly as pronounced, it still dwarfs the U.S. investment rate in coal.

The market for coal and low-cost electricity is there; the question is whether Congress and this Administration allow the United States to be the leader within the global coal market.

III. Regulatory Assault on Coal

Despite then-Senator Obama's commitment to coal on the campaign trail and his pledge on no middle class tax increases, his Administration's actions are greatly hurting the coal industry and he is imposing the Obama Energy Tax by administrative fiat. The Role for Coal in the New Energy Age is greatly hampered by the regulatory assault waged by the Obama Administration and in particular, the Environmental Protection Agency. Through a diverse set of new rules improperly promulgated using the Clean Air Act and other statutes, the domestic coal industry is facing challenges that make it nearly impossible to see a successful domestic future. While President Obama may not directly raise taxes, his Administration is implementing policies designed to increase the energy costs for all American families. This is the Obama Energy Tax, and we are in the process of calculating how much President Obama is costing American families each month in higher energy costs. The following is a list of the current Administration's recent regulations assaulting coal, some of which I will discuss further:

- Endangerment Finding
- Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule under the Clean Air Act
- Reconsideration of "EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program"
- Mandatory Greenhouse Gas Reporting Rule

- Proposed rule for Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells
- Memorandum: Improving EPA Review of Appalachian Surface Coal Mining Operations Under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order

a) Endangerment Finding

First, I'd like to talk about the Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, more commonly known as the "Endangerment Finding." This document permits the regulation of greenhouse gases under the Clean Air Act as they endanger both public health and public welfare. The Ohio Coal Association is challenging this Endangerment Finding in court, and we will win. We believe that the science underpinning the Endangerment Finding is questionable. In addition, EPA neglected required parts of the economic analysis that make the Findings substantially incomplete.

This document explicitly says, "The Administrator has determined that the body of scientific evidence compellingly supports this finding. The major assessments by the U.S. Global Climate Research Program (USGCRP), the [United Nations] Intergovernmental Panel on Climate Change (IPCC), and the National Research Council (NRC) serve as the primary scientific basis supporting the Administrator's endangerment finding."[4] These three sources all have corrupted data as a result of calculated political decisions what to include in public reports, but I'd like to focus on what we have learned about the UN IPCC since November. This is particularly important, as the IPCC's Fourth Assessment Report (AR4) is referenced 48 times in the Endangerment Finding and 395 times in the accompanying Technical Support Document.

Global warming alarmists say that Climategate does not alter the science behind global warming. I disagree. They have revealed a systematic breakdown of the scientific process, leading to the conclusion that the work done by the UN IPCC, the Hadley CRU and the British MET office should not be considered as true, unbiased science. Climategate has revealed a calculated suppression and discrediting of dissenting viewpoints, the conscious decision to selectively use non peer-reviewed science in support of a predetermined argument, political oppression interfering with science, corrupt data sets used for climate projections which cannot be replicated, and deliberate intent to profit off of international climate accord and other restrictions on fossil energy.

But this academic bias isn't just limited to the involved Climategate scientists; we in the coal industry see it on a daily basis from environmentalists who seize every opportunity to challenge our operations and other facets of coal use. We maintain the right to not accept the scientific theory of anthropogenic global warming because real world observations don't match up to

[4] Endangerment Finding, p.8-9

climate models. Since James Hansen first raised the climate change alarm in 1988, climate models have been consistently wrong in their projections.

Only 52 scientists signed the UN IPCC Fourth Assessment Report. With my testimony, I have attached multiple petitions from scientists refuting the theory of anthropogenic global warming.

- 31,486 American scientists, including 9,029 with PhDs, have signed onto a petition that states, "There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gasses is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate."[5]
- Over 1,100 scientists in 40 countries have signed the Manhattan Declaration on Climate Change, which explicitly states that, "current plans to restrict anthropogenic CO2 emissions are a dangerous misallocation of intellectual capital and resources that should be dedicated to solving humanity's real and serious problems. That there is no convincing evidence that CO2 emissions from modern industrial activity has in the past, is now, or will in the future cause catastrophic climate change."[6]

I realize that many Members of Congress and the Administration continue to say that nothing was wrong with the IPCC report, but it is important to note what we have learned since November:

- The underlying data sets cannot be replicated;
- There was a systematic attempt to keep climate skeptics out of peer-reviewed journals; and.
- The authors and reviewers of the IPCC come from the same incestuous pool of researchers.

Furthermore, we have learned that there is no "scientific consensus" behind the theory of anthropogenic global warming.

b) Clean Air Act

The Clean Air Act is an unsuitable mechanism for regulating greenhouse gases and will greatly jeopardize our nation's supply of low-cost electricity and our manufacturing base. It allows for a plethora of dangerous regulations despite statements from the Clean Air Act Amendments of 1990's authors, such as Dean of the House John Dingell, who said they intended for greenhouse gases not to be covered. The Obama White House is encouraging EPA to use the laws in

[5] Global Warming Petition Project http://www.petitionproject.org/. The Petition Project was organized by a group of physicists and physical chemists who conduct scientific research at several American scientific institutions and is financed by non-tax deductible donations to the Petition Project from private individuals, many of whom are signers of the petition. The project has no financing whatever from industrial sources. Please see attached materials for the 12-page scientific assessment and accompanying petition that 31,486 American scientists have signed.

[6] http://www.climatescienceinternational.org/index.php?option=com_content&task=view&id=37&Itemid=54

unintended ways that will accomplish nothing by way of reducing atmospheric concentrations of GHGs.

The additional permitting process proposed for New Sources and existing sources requiring upgrades is incredibly expensive and delays construction and development for years. It is just another permit for environmentalists to challenge in the courts, amounting to years of time wasted and hundreds of millions of dollars used for legal expenses that should instead be allocated for wages and economic development. Required installation of Maximum Available Control Technology (MACT) without cost-benefit analysis could force power plants to halt construction or even shut down, leaving millions of Americans without access to low-cost electricity in a time of economic downturn. National Ambient Air Quality Standards (NAAQS) set for greenhouse gases, which unlike criteria pollutants can travel across the globe, will be impossible to meet and could result in nonattainment areas losing their Federal highway dollars as the law states. Other provisions of the Clean Air Act are equally unsuitable for GHG regulation and don't allow for market mechanisms to reduce cost and increase efficiency.

c) Clean Water Act

Another assault on the domestic coal industry is coming through new interpretations of, and regulations through, the Clean Water Act. On March 22, 2010, EPA published a Federal Register notice with a November deadline to solicit input on "what considerations EPA should take into account when deciding how to address listing of waters as threatened or impaired for ocean acidification under the 303(d) program. . . . If waters were determined to be threatened or impaired for ocean acidification under 303(d), what issues should EPA and states take into account when considering how to address TMDL development for such waters?" The Center for Biological Diversity, along with other environmentalists, are pushing for to find waters "impaired" by acidification specifically caused by GHG emissions and require first-time total maximum daily load ("TMDL") regulations that could include harsh carbon dioxide curbs. This will result in a roundabout way to further regulate coal in an attempt to change the pH of the Atlantic Ocean. A fool's errand.

In addition, I heard Rep. Nick Rahall defending the Administration after another Member had accused the Administration of waging a regulatory war on coal.[7] The very next day, EPA announced a veto of a surface coal mine permit which had already received approval from the Army Corps of Engineers. While the Clean Water Act gives agency officials the ability to veto proposed permits for surface coal mining, this is the first time in history they have used this

[7] Subcommittee on Energy and Mineral Resources: Oversight Hearing on "The President's Fiscal Year 2011 budget requests for the Minerals Management Service, the Bureau of Land Management, the Office of Surface Mining Reclamation and Enforcement, the United States Geological Survey (excluding the water resources program), and the USDA Forest Service." March 25, 2010. See archived video at http://resourcescommittee.house.gov/index.php?option=com_jcalpro&itemid=27&extmode=view&extid=329

authority to block an existing permit. This comes after the Administration announced a temporary moratorium on surface coal mining when they took office.

Last week, EPA released Clean Water Act surface mining guidance for Appalachia. While the Administrator's public comments and the Agency's press releases tout significant environmental benefits, this guidance that goes into effect immediately does not rely on peer-reviewed science, applies retroactively to permits under consideration and ignores significant amount of field work showing additional factors affecting water conductivity levels. In short, this egregious mis-use of science to promulgate regulations effective immediately opens the floodgate to new lawsuits halting surface mining. The accompanying non-peer-reviewed "science" documents even links negative environmental effects to slurries and deep mining, a foreshadowing of a potential attempt to extend unfounded restrictions on surface coal mining to underground coal and minerals mining.

d) Endangered Species Act

While Interior Secretary Ken Salazar announced that his Agency would not invoke the Endangered Species Act (ESA) to restrict greenhouse gases threatening the polar bear and its habitat, he acknowledged that the greatest threat to the polar bear "is the melting of Arctic sea ice due to climate change." In fact, data from the U.S. National Snow and Ice Data Center in Colorado shows that Arctic ice is approaching long-term average levels for the first time in years.[8] In addition, the annual summer Arctic ice melt has started later in the calendar year than any time in the NSICD's 31 year history. The UN IPCC models, which predict an ice-free Arctic summer in 2013, cannot account for these real-world empirical observations. Furthermore, Harry Flaherty, Chair of the Nunavut Wildlife Management Board in Canada, says the bear population in the region has doubled in the past 10 years. Dr. Mitchell Taylor, a biologist who has been researching polar bear populations in Canada's Nunavut Territory for 35 years, agrees.[9]

The Interior Department has not given up trying to use ESA to limit coal use: in response to a lawsuit by environmentalists, they announced a study to assess whether the American pika should be listed as threatened because of climate change. In addition, the National Oceanic and Atmospheric Administration (NOAA) is examining whether ringed and bearded seals are endangered by human-caused climate change. In Ohio, mines have faced significant delays and rejected permits due to the declining population of the Indiana bat, a ¼ oz chestnut-colored bat that has been listed as an Endangered Species since 1967. Not once has an Ohio mine in operation discovered any Indiana bats.

Using the Endangered Species Act for climate change action would make the ill-equipped Fish and Wildlife Service (FWS) responsible for policing emissions. I am uncertain as to how FWS

[8] http://www.dailymail.co.uk/sciencetech/article-1263207/Increase-Arctic-ice-confounds-doomsayers.html
[9] http://www.examiner.com/x-32936-Seminole-County-Environmental-News-Examiner~y2010m1d8-Canadas-growing-polar-bear-population-becoming-a-problem-locals-say

could use the ESA to limit greenhouse gases and coal use, but I caution against blaming something as vague as natural variations in climate or evolution for the degradation of a species' habitat. Using the ESA, which requires no analysis of economic consequences, is an improper way to force additional restrictions on the coal and fossil fuel industries.

e) Mandatory Reporting of Greenhouse Gases Rule

To highlight the complexity of regulations going into effect January 2, 2011, less than 9 months away, we should look at the Mandatory GHG Reporting Rule. It has been well over two years since this rule was mandated by law, but EPA still has not finalized the rule for Underground Coal Mines and Suppliers of Coal. While other sources of greenhouse gases must start reporting their emissions, EPA could not adequately respond to the coal industry's concerns over a simple reporting requirement.

EPA's proposed rule wanted coal mining operations to account for their product's carbon content, yet actual emitters are also required to report. This is a blatant attempt to overinflate statistics by double-counting. EPA also proposed a "once-in, always-in" provision that would require even closed coal mines to report on an annual basis, penalizing the coal industry for no action or operation.

Furthermore, EPA adds the significant burden of continual greenhouse gas reporting when this information is already available to the Agency. The Energy Information Agency receives coal data from every power plant in the country generating more than 1 megawatt of electricity. This data includes Btu value, sulfur content and ash content. With heating value conversion to carbon content already established by EPA, this data is already calculable. There is absolutely no reason to add the significant costs already upon the coal industry by forcing expensive monitoring equipment and the creation of non-safety and non-mining personnel, yet EPA chooses to continue with their regulatory assault on every aspect of coal production.

IV. Legislative War on Coal

a) American Clean Energy and Security Act

This Congress is also pursuing policies that endanger the future of coal, low-cost electricity and our nation's economic livelihood. Climate change legislation such as the Waxman-Markey bill destroys the coal industry. It is a misguided attempt to micromanage our country's energy supply. During the floor debate last year, we heard about the legislation's vast wealth transfers, backroom deals with special interests, economic disparities based on regional differences, inability to actually reduce global atmospheric concentrations according to EPA Administrator Jackson and DOE Secretary Chu, jobs lost and lack of provisions that help with long-term adaptation to climate change.

In an attempt to buy off the coal industry, the legislation allocates $10 billion dollars towards carbon capture and sequestration (CCS), but misses the mark in two regards. First, the legislation ignores the realistic timeline of technological development. The legislation requires emissions reductions starting in 2012 and further incorporates restrictive performance standards on coal-fired power plants starting in 2020, completely ignoring what developers of CCS technology are saying: that CCS is at least 15-20 years away from true commercial deployment. The United States Congress simply cannot dictate the timeline of technological development.

Second, the Bill calls merely for a study to report back to Congress with recommendations on issues such as CCS liability, permitting and other environmental considerations. We've seen these mandated studies before in previous laws. Congress will neither examine the report nor act on it. Despite CRS and GAO reports outlining the necessary steps to take, environmentalists have successfully prevented their inclusion into legislative proposals in order to ensure coal's demise. The way the CCS program in the Waxman-Markey bill is structured actually encourages massive fuel-switching to the more expensive natural gas before CCS can be deployed on coal-fired power plants. But even then, the lack of regulatory, legal and liability frameworks will prevent commercial deployment of the technology.

b) Cap-and-dividend

Proposals such as the Cantwell-Collins CLEAR Act are as much a death knell for the coal industry as the ACES bill. Instead of forcing polluters to pay for emissions, this legislative draft makes the coal producer pay for the carbon content of their product without considering the end-use of the coal.

As Members may not be aware, coal is used in far more than just electricity generation. Users of coal include metallurgical refineries, paper manufacturers, the chemical industry and the pharmaceutical industry. Coal byproducts are used to manufacture chemicals such as creosote oil, naphthalene, phenol and benzene. Coal byproducts are also found in aspirin, soaps, solvents, dyes and plastics. Specialized, high-tech products that use coal as an essential ingredient include silicon metal, carbon fiber and activated carbon used in air and water purification as well as kidney dialysis machines. Cap-and-dividend will undoubtedly make these products significantly more expensive.

The CLEAR Act's concept of returning revenues generated to ratepayers is novel; however, in its current form we see the same regional disparities that penalizing Midwestern states such as Ohio, Indiana, West Virginia, Missouri and Kentucky. The legislation states that only ¾ of generated revenues is returned on a per-capita basis, meaning those who purchase coal-fired electricity will indirectly be subsidizing the electricity bills of states like Oregon or Massachusetts that use little coal for electricity. We cannot accept this sort of proposal due to the huge burden borne by the coal mining industry without being able to reimburse our customers and consumers of our

products in fair value. I'd caution Senators Kerry, Graham and Lieberman from using such a mechanism in their forthcoming proposal.

V. Industry Perspective on the Role For Coal

Domestic coal production needs the support of Congress and the Administration. We must increase our utilization of coal to encourage low-cost electricity, alleviating problems associated with our current recession and aiding in the rebuilding of our nation's manufacturing base. Coal mining provides well-above-average salaries, provides countless billions in revenues for local governments and gives towns based around the coal industry a sense of community. In Ohio, our coal workers make just over $64,000 on average,[10] approximately $25,000 more than the State average annual income. It is estimated that Ohio coal companies spend $300 million annually for taxes and fees to local and state agencies, providing crucial revenue for schools and other public works projects.

Furthermore, during the debate over Waxman-Markey, much attention has been given to "American leadership." Our nation's proud history of coal use has given us unparalleled mining efficiency, safety mechanisms, environmental management, transportation systems and technological processes to use coal for a wide variety of purposes. We are the world leaders in the coal industry. However, many people are willing to sacrifice this in order to lead the world in renewable energy technologies. There is absolutely no reason we cannot lead in both coal and renewables. It is time to lead the world and export our knowledge and coal to developing foreign nations. We can help them prevent significant loss of life and minimize environmental impact by helping them develop the environmental permitting processes surrounding coal production. No legislative proposals are helping our domestic industry do so.

Climate change legislation supporters claim the mantle of "moral authority," touting the benefits of "saving the world for future generations." I encourage these people to stand back and take a broad view of where we are today. Over 1.6 billion people lack access to electricity and potable water. Opponents of coal use are the single largest detriment to developing nations and the billions of humans living in poverty. International agreements, such as ones developed in Kyoto and Copenhagen, encourage the "civilized" world to pay poor nations not to develop in the same way that has made our nation the world's superpower. When wind and solar power become cost-effective without massive taxpayer-funded subsidies in 15 or 20 years, these technologies will still be unable to meet the developing world's baseload energy demands. It is time to act now to help these people. We must encourage developing nations to use our low-cost coal to improve the quality of life of their citizens. It is a win-win situation for the U.S. and developing world:

[10] According to the National Mining Association. The average Ohio coal miner earns $64,479. http://www.nma.org/pdf/c_wages_state_industries.pdf. By contrast, the Bureau of Labor Statistics estimates that each nonsupervisory coal miner makes $56,836. However, this does not include shift managers and is a nation-wide estimate. http://www.bls.gov/oco/cg/cgs004.htm

we make great strides in eliminating global poverty while simultaneously improving our own economic growth.

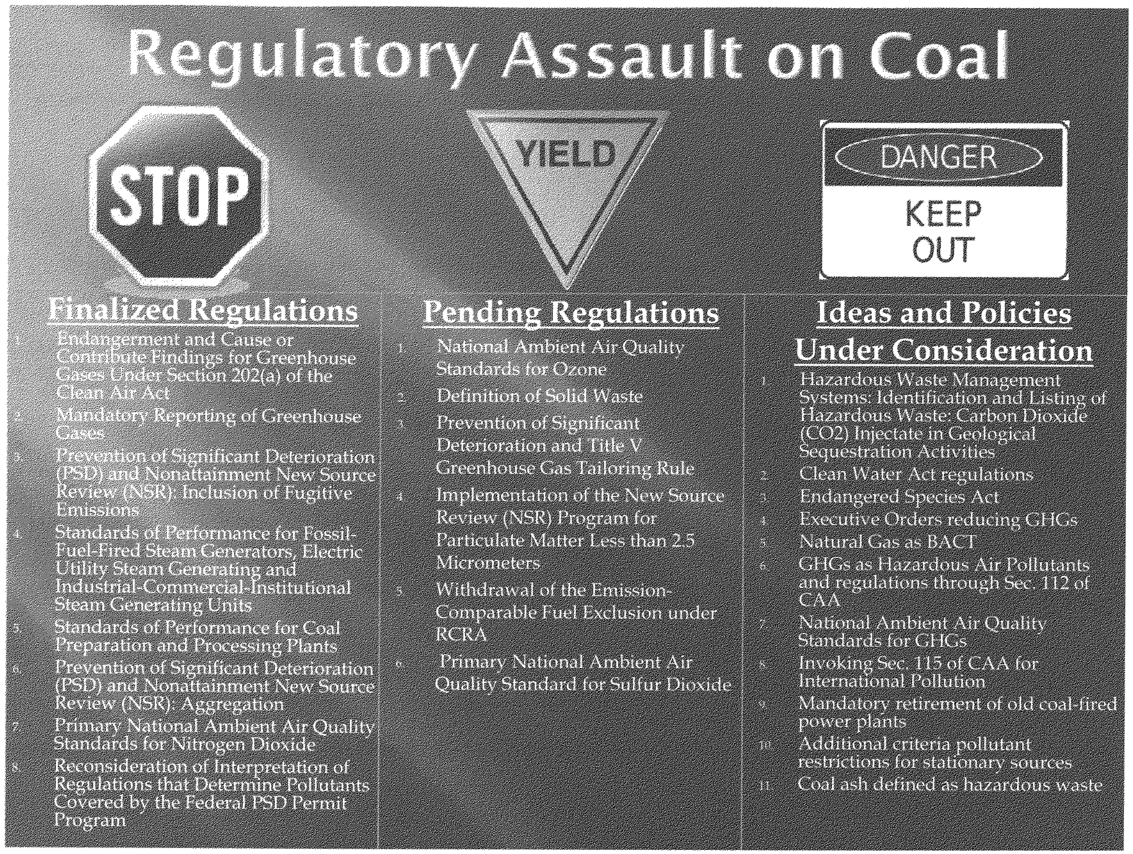
Despite recent events in West Virginia, the U.S. coal mining industry has the best safety record in the world. Mine Safety & Health Administration data shows 18 coal mining fatalities last year amongst 133,000 miners, an improvement of 63% from just three years earlier.[11] By contrast, the BBC estimates that 13 Chinese coal miners die every day.[12] Our safety record is largely due to combined national and state efforts to encourage innovative safety practices. The Ohio Coal Association recently collaborated with the Ohio state legislature to pass a new mine safety bill despite no fatalities in 5 years. Please see our attached summary of the legislation at the end of this testimony.

The industry is truly committed to improving mining safety and the lives of all our employees, and we will continue to invest in new safety equipment and explore new safety techniques. As we continue to improve our safety here in the U.S., we believe it is imperative to export our mining safety mechanisms and equipment to the 70 coal-producing nations that lack such advanced safeguards.

The coal industry knows what Congress and the Administration is doing. Every day our miners and support industry workers ask what we are doing to ensure their economic livelihood. These workers and communities won't soon forget the increased taxes and restrictions forced upon us. Congressional and Administration support for clean coal can be a valuable export that will improve the safety and environmental impact of coal worldwide.

I thank you for this opportunity to testify. The coal industry will continue to oppose misguided climate change legislation and costly regulations that hurt not just our own nation, but the rest of the world as well. We stand by our principles and our country, as we always have and as we always will.

[11] http://www.msha.gov/MSHAINFO/FactSheets/MSHAFCT10.HTM
[12] http://news.bbc.co.uk/2/hi/asia-pacific/7132017.stm


Regulatory Assault on Coal
STOP
YIELD
DANGER
KEEP OUT
Finalized Regulations
1. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act
2. Mandatory Reporting of Greenhouse Gases
3. Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Inclusion of Fugitive Emissions
4. Standards of Performance for Fossil-Fuel-Fired Steam Generators, Electric Utility Steam Generating and Industrial-Commercial-Institutional Steam Generating Units
5. Standards of Performance for Coal Preparation and Processing Plants
6. Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Aggregation
7. Primary National Ambient Air Quality Standards for Nitrogen Dioxide
8. Reconsideration of Interpretation of Regulations that Determine Pollutants Covered by the Federal PSD Permit Program
Pending Regulations
1. National Ambient Air Quality Standards for Ozone
2. Definition of Solid Waste
3. Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule
4. Implementation of the New Source Review (NSR) Program for Particulate Matter Less than 2.5 Micrometers
5. Withdrawal of the Emission-Comparable Fuel Exclusion under RCRA
6. Primary National Ambient Air Quality Standard for Sulfur Dioxide
Ideas and Policies Under Consideration
1. Hazardous Waste Management Systems: Identification and Listing of Hazardous Waste: Carbon Dioxide (CO2) Injectate in Geological Sequestration Activities
2. Clean Water Act regulations
3. Endangered Species Act
4. Executive Orders reducing GHGs
5. Natural Gas as BACT
6. GHGs as Hazardous Air Pollutants and regulations through Sec. 112 of CAA
7. National Ambient Air Quality Standards for GHGs
8. Invoking Sec. 115 of CAA for International Pollution
9. Mandatory retirement of old coal-fired power plants
10. Additional criteria pollutant restrictions for stationary sources
11. Coal ash defined as hazardous waste

Ohio Mine Safety Bill

This bill passed in 2008 granted money to be transferred from the BWC to create a Mine safety fund that built a state of the art mine safety training facility as well as funds the mine safety division of the Ohio Department of Natural Resources and provides training to mine rescue teams in Ohio. This was a bipartisan bill that revolutionized Ohio's mine safety laws.

Am. S.B. 323

127th General Assembly
(As Passed by the General Assembly)

Sens. Niehaus, Wilson, Harris, Carey, Schuler, Padgett, Seitz, Spada, Mumper, Schaffer, Morano, Boccieri, Cafaro, Fedor, Goodman, Grendell, Kearney, D. Miller, R. Miller, Sawyer, Smith, Stivers, Cates, Amstutz, Faber, Mason, Wagoner, Austria

Reps. Sayre, Yates, Domenick, Gibbs, Batchelder, Bolon, Book, Budish, Celeste, Chandler, Collier, Combs, Driehaus, Dyer, Evans, Flowers, Foley, Gardner, Garrison, Gerberry, Goyal, J. Hagan, Harwood, Hite, Hottinger, Hughes, Luckie, Lundy, J. McGregor, Mecklenborg, Oelslager, Patton, Schlichter, Schneider, Skindell, Slesnick, D. Stewart, J. Stewart, Strahorn, Szollosi, Uecker, B. Williams, Yuko
Effective date: Emergency, June 11, 2008

ACT SUMMARY

- Creates the Mine Safety Fund to be used for specified mine safety purposes, and authorizes the Administrator of Workers' Compensation to transfer a portion of the interest money from the continuing Coal-Workers Pneumoconiosis Fund to the Mine Safety Fund.
- Requires applicants for examination for certification as mine forepersons or forepersons of gaseous or nongaseous mines to pay a fee established in rules adopted by the Chief of the Division of Mineral Resources Management in the Department of Natural Resources under the act rather than a $10 fee established in former law.
- Requires a person who has been certified as a mine foreperson or foreperson of a gaseous mine or nongaseous coal mine and who has not worked in an underground coal mine for more than two years to be recertified, requires such a previously certified person who has not worked in an underground coal mine for at least one year to successfully complete a retraining course, and requires the Chief to adopt rules governing recertification and retraining.
- Generally, establishes immunity for mine rescue crew members, employers of crew members, and employees of the Division of Mineral Resources Management from liability in any civil action that arises for damage or injury caused in the performance of rescue work at an underground coal mine.
- Allows the operator of an underground coal mine to provide a mine medical responder at the mine in order to comply with the continuing requirement that an emergency medical technician be on duty at the mine when miners are working, requires the Chief to adopt rules governing mine medical responder training, continuing training, examination, and an examination fee, and defines "mine medical responder" as a person who has satisfied the requirements established in rules.
- Requires the operator of an underground coal mine to provide tag lines or tie-off lines for each miner at the mine, requires mine employees to use tag lines or tie-off lines, and requires the Chief to adopt rules governing tag line and tie-off line use.
- Requires the operator of an underground coal mine to install fire detection devices on each conveyor belt that is used in the mine, and requires the Chief to adopt rules governing the use of such fire detection devices.
- Delays by one day the date by which the Administrator of Workers' Compensation must transition from use of the Micro Insurance Reserve Analysis System.
- Declares an emergency.

Environmental Effects of Increased Atmospheric Carbon Dioxide

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Oregon Institute of Science and Medicine, 2251 Dick George Road, Cave Junction, Oregon 97523 [artr@oism.org]

ABSTRACT A review of the research literature concerning the environmental consequences of increased levels of atmospheric carbon dioxide leads to the conclusion that increases during the 20th and early 21st centuries have produced no deleterious effects upon Earth's weather and climate. Increased carbon dioxide has, however, markedly increased plant growth. Predictions of harmful climatic effects due to future increases in hydrocarbon use and minor greenhouse gases like CO_2 do not conform to current experimental knowledge. The environmental effects of rapid expansion of the nuclear and hydrocarbon energy industries are discussed.

SUMMARY

Political leaders gathered in Kyoto, Japan, in December 1997 to consider a world treaty restricting human production of "greenhouse gases," chiefly carbon dioxide (CO_2). They feared that CO_2 would result in "human-caused global warming" – hypothetical severe increases in Earth's temperatures, with disastrous environmental consequences. During the past 10 years, many political efforts have been made to force worldwide agreement to the Kyoto treaty.

When we reviewed this subject in 1998 (1,2), existing satellite records were short and were centered on a period of changing intermediate temperature trends. Additional experimental data have now been obtained, so better answers to the questions raised by the hypothesis of "human-caused global warming" are now available.

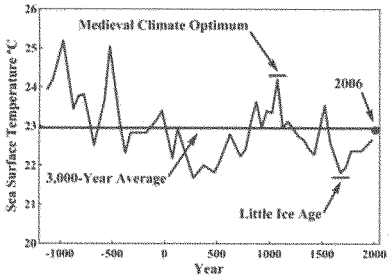

Figure 1: Surface temperatures in the Sargasso Sea, a 2 million square mile region of the Atlantic Ocean, with time resolution of 50 to 100 years and ending in 1975, as determined by isotope ratios of marine organism remains in sediment at the bottom of the sea (3). The horizontal line is the average temperature for this 3,000-year period. The Little Ice Age and Medieval Climate Optimum were naturally occurring, extended intervals of climate departures from the mean. A value of 0.25 °C, which is the change in Sargasso Sea temperature between 1975 and 2006, has been added to the 1975 data in order to provide a 2006 temperature value.

The average temperature of the Earth has varied within a range of about 3°C during the past 3,000 years. It is currently increasing as the Earth recovers from a period that is known as the Little Ice Age, as shown in Figure 1. George Washington and his army were at Valley Forge during the coldest era in 1,500 years, but even then the temperature was only about 1° Centigrade below the 3,000-year average.

The most recent part of this warming period is reflected by shortening of world glaciers, as shown in Figure 2. Glaciers regularly lengthen and shorten in delayed correlation with cooling and warming trends. Shortening lags temperature by about 20 years, so the current warming trend began in about 1800.

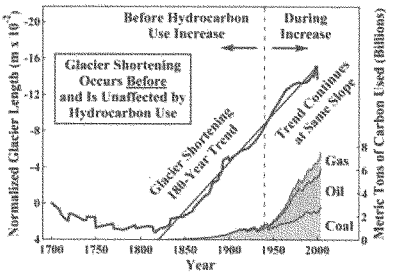

Figure 2: Average length of 169 glaciers from 1700 to 2000 (4). The principal source of melt energy is solar radiation. Variations in glacier mass and length are primarily due to temperature and precipitation (5,6). This melting trend lags the temperature increase by about 20 years, so it predates the 6-fold increase in hydrocarbon use (7) even more than shown in the figure. Hydrocarbon use could not have caused this shortening trend.

Atmospheric temperature is regulated by the sun, which fluctuates in activity as shown in Figure 3; by the greenhouse effect, largely caused by atmospheric water vapor (H_2O); and by other phenomena that are more poorly understood. While major greenhouse gas H_2O substantially warms the Earth, minor greenhouse gases such as CO_2

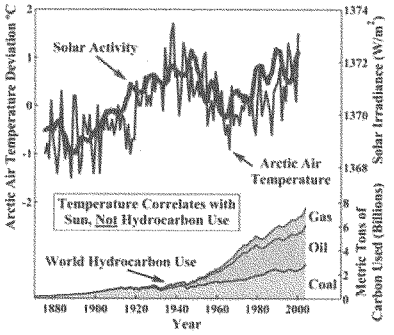

Figure 3: Arctic surface air temperature compared with total solar irradiance as measured by sunspot cycle amplitude, sunspot cycle length, solar equatorial rotation rate, fraction of penumbral spots, and decay rate of the 11-year sunspot cycle (8,9). Solar irradiance correlates well with Arctic temperature, while hydrocarbon use (7) does not correlate.

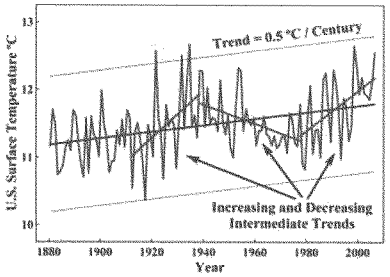

Figure 4: Annual mean surface temperatures in the contiguous United States between 1880 and 2006 (10). The slope of the least-squares trend line for this 127-year record is 0.5 °C per century.

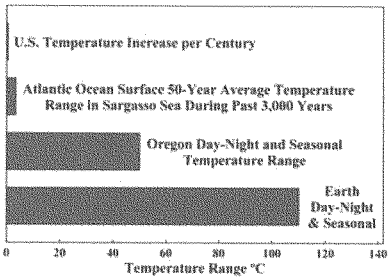

Figure 6: Comparison between the current U.S. temperature change per century, the 3,000-year temperature range in Figure 1, seasonal and diurnal range in Oregon, and seasonal and diurnal range throughout the Earth.

have little effect, as shown in Figures 2 and 3. The 6-fold increase in hydrocarbon use since 1940 has had no noticeable effect on atmospheric temperature or on the trend in glacier length.

While Figure 1 is illustrative of most geographical locations, there is great variability of temperature records with location and regional climate. Comprehensive surveys of published temperature records confirm the principal features of Figure 1, including the fact that the current Earth temperature is approximately 1 °C lower than that during the Medieval Climate Optimum 1,000 years ago (11,12).

Surface temperatures in the United States during the past century reflect this natural warming trend and its correlation with solar activity, as shown in Figures 4 and 5. Compiled U.S. surface temperatures have increased about 0.5 °C per century, which is consistent with other historical values of 0.4 to 0.5 °C per century during the recovery from the Little Ice Age (13-17). This temperature change is slight as compared with other natural variations, as shown in Figure 6. Three intermediate trends are evident, including the decreasing trend used to justify fears of "global cooling" in the 1970s.

Between 1900 and 2000, on absolute scales of solar irradiance and degrees Kelvin, solar activity increased 0.19%, while a 0.5 °C temperature change is 0.21%. This is in good agreement with estimates that Earth's temperature would be reduced by 0.6 °C through particulate blocking of the sun by 0.2% (18).

Solar activity and U.S. surface temperature are closely correlated, as shown in Figure 5, but U.S. surface temperature and world hydrocarbon use are not correlated, as shown in Figure 13.

The U.S. temperature trend is so slight that, were the temperature change which has taken place during the 20th and 21st centuries to occur in an ordinary room, most of the people in the room would be unaware of it.

During the current period of recovery from the Little Ice Age, the U.S. climate has improved somewhat, with more rainfall, fewer tornados, and no increase in hurricane activity, as illustrated in Figures 7 to 10. Sea level has trended upward for the past 150 years at a rate of 7 inches per century, with 3 intermediate uptrends and 2 periods of no increase as shown in Figure 11. These features are confirmed by the glacier record as shown in Figure 12. If this trend continues as

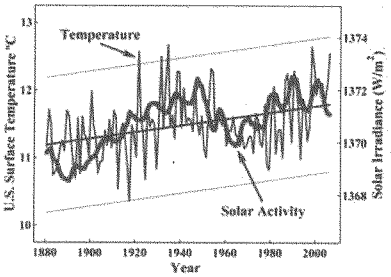

Figure 5: U.S. surface temperature from Figure 4 as compared with total solar irradiance (19) from Figure 3.

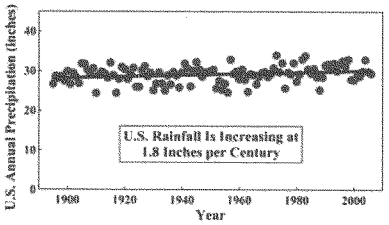

Figure 7: Annual precipitation in the contiguous 48 United States between 1895 and 2006. U.S. National Climatic Data Center, U.S. Department of Commerce 2006 Climate Review (20). The trend shows an increase in rainfall of 1.8 inches per century – approximately 6% per century.

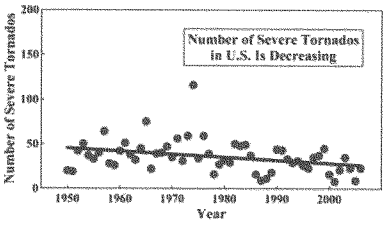

Figure 8: Annual number of strong-to-violent category F3 to F5 tornados during the March-to-August tornado season in the U.S. between 1950 and 2006. U.S. National Climatic Data Center, U.S. Department of Commerce 2006 Climate Review (20). During this period, world hydrocarbon use increased 6-fold, while violent tornado frequency decreased by 43%.

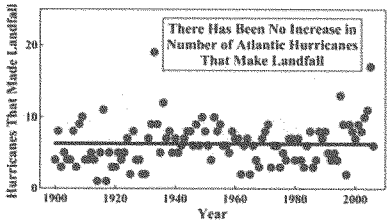

Figure 9: Annual number of Atlantic hurricanes that made landfall between 1900 and 2006 (21). Line is drawn at mean value.

did that prior to the Medieval Climate Optimum, sea level would be expected to rise about 1 foot during the next 200 years.

As shown in Figures 2, 11, and 12, the trends in glacier shortening and sea level rise began a century ***before*** the 60-year 6-fold increase in hydrocarbon use, and have not changed during that increase. Hydrocarbon use could not have caused these trends.

During the past 50 years, atmospheric CO_2 has increased by 22%. Much of that CO_2 increase is attributable to the 6-fold increase in human use of hydrocarbon energy. Figures 2, 3, 11, 12, and 13 show, however, that human use of hydrocarbons has not caused the observed increases in temperature.

The increase in atmospheric carbon dioxide has, however, had a substantial environmental effect. Atmospheric CO_2 fertilizes plants. Higher CO_2 enables plants to grow faster and larger and to live in drier climates. Plants provide food for animals, which are thereby also enhanced. The extent and diversity of plant and animal life have both increased substantially during the past half-century. Increased temperature has also mildly stimulated plant growth.

Does a catastrophic amplification of these trends with damaging climatological consequences lie ahead? There are no experimental data that suggest this. There is also no experimentally validated theoretical evidence of such an amplification.

Predictions of catastrophic global warming are based on computer climate modeling, a branch of science still in its infancy. The empirical evidence – actual measurements of Earth's temperature and climate – shows no man-made warming trend. Indeed, during four of the seven decades since 1940 when average CO_2 levels steadily increased, U.S. average temperatures were actually decreasing.

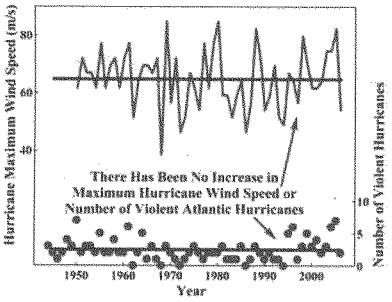

Figure 10: Annual number of violent hurricanes and maximum attained wind speed during those hurricanes in the Atlantic Ocean between 1944 and 2006 (22,23). There is no upward trend in either of these records. During this period, world hydrocarbon use increased 6-fold. Lines are mean values.

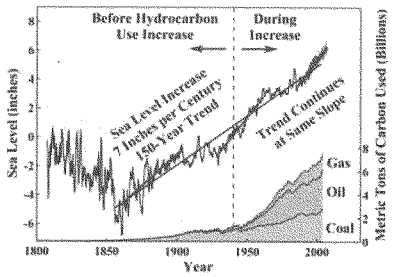

Figure 11: Global sea level measured by surface gauges between 1807 and 2002 (24) and by satellite between 1993 and 2006 (25). Satellite measurements are shown in gray and agree with tide gauge measurements. The overall trend is an increase of 7 inches per century. Intermediate trends are 9, 0, 12, 0, and 12 inches per century, respectively. This trend lags the temperature increase, so it predates the increase in hydrocarbon use even more than is shown. It is unaffected by the very large increase in hydrocarbon use.

While CO_2 levels have increased substantially and are expected to continue doing so and humans have been responsible for part of this increase, the effect on the environment has been benign.

There is, however, one very dangerous possibility.

Our industrial and technological civilization depends upon abundant, low-cost energy. This civilization has already brought unprecedented prosperity to the people of the more developed nations. Billions of people in the less developed nations are now lifting themselves from poverty by adopting this technology.

Hydrocarbons are essential sources of energy to sustain and extend prosperity. This is especially true of the developing nations, where available capital and technology are insufficient to meet rapidly increasing energy needs without extensive use of hydrocarbon fuels. If, through misunderstanding of the underlying science and through misguided public fear and hysteria, mankind significantly rations and restricts the use of hydrocarbons, the worldwide increase in prosperity will stop. The result would be vast human suffering and the loss of hundreds of millions of human lives. Moreover, the prosperity of those in the developed countries would be greatly reduced.

Mild ordinary natural increases in the Earth's temperature have occurred during the past two to three centuries. These have resulted in some improvements in overall climate and also some changes in

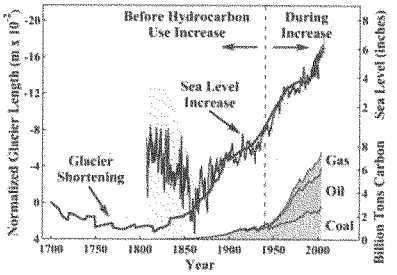

Figure 12: Glacier shortening (4) and sea level rise (24,25). Gray area designates estimated range of error in the sea level record. These measurements lag air temperature increases by about 20 years. So, the trends began more than a century before increases in hydrocarbon use.

the landscape, such as a reduction in glacier lengths and increased vegetation in colder areas. Far greater changes have occurred during the time that all current species of animals and plants have been on the Earth. The relative population sizes of the species and their geographical distributions vary as they adapt to changing conditions.

The temperature of the Earth is continuing its process of fluctuation in correlation with variations in natural phenomena. Mankind, meanwhile, is moving some of the carbon in coal, oil, and natural gas from below ground to the atmosphere and surface, where it is available for conversion into living things. We are living in an increasingly lush environment of plants and animals as a result. This is an unexpected and wonderful gift from the Industrial Revolution.

ATMOSPHERIC AND SURFACE TEMPERATURES

Atmospheric and surface temperatures have been recovering from an unusually cold period. During the time between 200 and 500 years ago, the Earth was experiencing the "Little Ice Age." It had descended into this relatively cool period from a warm interval about 1,000 years ago known as the "Medieval Climate Optimum." This is shown in Figure 1 for the Sargasso Sea.

During the Medieval Climate Optimum, temperatures were warm enough to allow the colonization of Greenland. These colonies were abandoned after the onset of colder temperatures. For the past 200 to 300 years, Earth temperatures have been gradually recovering (26). Sargasso Sea temperatures are now approximately equal to the average for the previous 3,000 years.

The historical record does not contain any report of "global warming" catastrophes, even though temperatures have been higher than they are now during much of the last three millennia.

The 3,000-year range of temperatures in the Sargasso Sea is typical of most places. Temperature records vary widely with geographical location as a result of climatological characteristics unique to those specific regions, so an "average" Earth temperature is less meaningful than individual records (27). So called "global" or "hemispheric" averages contain errors created by averaging systematically different aspects of unique geographical regions and by inclusion of regions where temperature records are unreliable.

Three key features of the temperature record – the Medieval Climate Optimum, the Little Ice Age, and the Not-Unusual-Temperature of the 20th century – have been verified by a review of local temperature and temperature-correlated records throughout the world (11), as summarized in Table 1. Each record was scored with respect to those queries to which it applied. The experimental and historical literature definitively confirms the primary features of Figure 1.

Most geographical locations experienced both the Medieval Climate Optimum and the Little Ice Age – and most locations did not

Table 1: Query	Yes	No	Yes/No	Two-Tailed Probability
Warm Climatic Anomaly 800-1300 A.D.?	88	2	7	> 99.99
Cold Climatic Anomaly 1300-1900 A.D.?	105	2	2	> 99.99
20th Century Warmest in Individual Record?	7	64	14	< 0.0001

Table 1: Comprehensive review of all instances in which temperature or temperature-correlated records from localities throughout the world permit answers to queries concerning the existence of the Medieval Climate Optimum, the Little Ice Age, and an unusually warm anomaly in the 20th century (11). The compiled and tabulated answers confirm the three principal features of the Sargasso Sea record shown in Figure 1. The probability that the answer to the query in column 1 is "yes" is given in column 5.

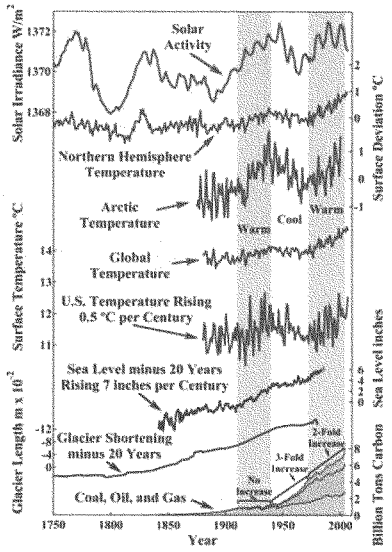

Figure 13: Seven independent records – solar activity (9); Northern Hemisphere, (13), Arctic (28), global (10), and U.S. (10) annual surface air temperatures; sea level (24,25); and glacier length (4) – all qualitatively confirm each other by exhibiting three intermediate trends – warmer, cooler, and warmer. Sea level and glacier length are shown minus 20 years, correcting for their 20-year lag of atmospheric temperature. Solar activity, Northern Hemisphere temperature, and glacier lengths show a low in about 1800.

Hydrocarbon use (7) is uncorrelated with temperature. Temperature rose for a century before significant hydrocarbon use. Temperature rose between 1910 and 1940, while hydrocarbon use was almost unchanged. Temperature then fell between 1940 and 1972, while hydrocarbon use rose by 330%. Also, the 150 to 200-year slopes of the sea level and glacier trends were unchanged by the very large increase in hydrocarbon use after 1940.

experience temperatures that were unusually warm during the 20th century. A review of 23 quantitative records has demonstrated that mean and median world temperatures in 2006 were, on average, approximately 1 °C or 2 °F cooler than in the Medieval Period (12).

World glacier length (4) and world sea level (24,25) measurements provide records of the recent cycle of recovery. Warmer temperatures diminish glaciers and cause sea level to rise because of decreased ocean water density and other factors.

These measurements show that the trend of 7 inches per century increase in sea level and the shortening trend in average glacier length both began a century before 1940, yet 84% of total human annual hydrocarbon use occurred only after 1940. Moreover, neither of these trends has accelerated during the period between 1940 and 2007, while hydrocarbon use increased 6-fold. Sea level and glacier records are offset by about 20 years because of the delay between temperature rise and glacier and sea level change.

If the natural trend in sea level increase continues for another two centuries as did the temperature rise in the Sargasso Sea as the Earth entered the Medieval Warm Period, sea level would be expected to rise about 1 foot between the years 2000 and 2200. Both the sea level and glacier trends – and the temperature trend that they reflect – are

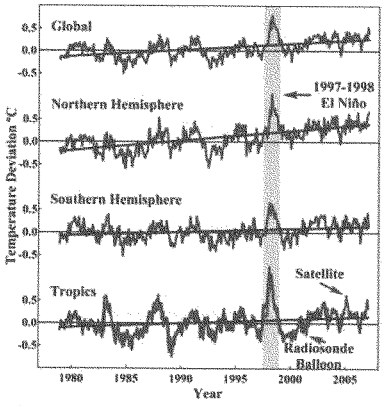

Figure 14: Satellite microwave sounding unit (blue) measurements of tropospheric temperatures in the Northern Hemisphere between 0 and 82.5 N, Southern Hemisphere between 0 and 82.5 S, tropics between 20S and 20N, and the globe between 82.5N and 82.5S between 1979 and 2007 (29), and radiosonde balloon (red) measurements in the tropics (29). The balloon measurements confirm the satellite technique (29-31). The warming anomaly in 1997-1998 (gray) was caused by El Niño, which, like the overall trends, is unrelated to CO_2 (32).

unrelated to hydrocarbon use. A further doubling of world hydrocarbon use would not change these trends.

Figure 12 shows the close correlation between the sea level and glacier records, which further validates both records and the duration and character of the temperature change that gave rise to them.

Figure 4 shows the annual temperature in the United States during the past 127 years. This record has an upward trend of 0.5 ºC per century. Global and Northern Hemisphere surface temperature records shown in Figure 13 trend upward at 0.6 ºC per century. These records are, however, biased toward higher temperatures in several ways. For example, they preferentially use data near populated areas (33), where heat island effects are prevalent, as illustrated in Figure 15. A trend of 0.5 ºC per century is more representative (13-17).

The U.S. temperature record has two intermediate uptrends of comparable magnitude, one occurring before the 6-fold increase in hydrocarbon use and one during it. Between these two is an intermediate temperature downtrend, which led in the 1970s to fears of an impending new ice age. This decrease in temperature occurred during a period in which hydrocarbon use increased 3-fold.

Seven independent records – solar irradiance; Arctic, Northern Hemisphere, global, and U.S. annual average surface air temperatures; sea level; and glacier length – all exhibit these three intermediate trends, as shown in Figure 13. These trends confirm one another. Solar irradiance correlates with them. Hydrocarbon use does not.

The intermediate uptrend in temperature between 1980 and 2006 shown in Figure 13 is similar to that shown in Figure 14 for balloon and satellite tropospheric measurements. This trend is more pronounced in the Northern Hemisphere than in the Southern. Contrary to the CO_2 warming climate models, however, tropospheric temperatures are not rising faster than surface temperatures.

Figure 6 illustrates the magnitudes of these temperature changes by comparing the 0.5 ºC per century temperature change as the Earth recovers from the Little Ice Age, the range of 50-year averaged Atlantic ocean surface temperatures in the Sargasso Sea over the past 3,000 years, the range of day-night and seasonal variation on average in Oregon, and the range of day-night and seasonal variation over the whole Earth. The two-century-long temperature change is small.

Tropospheric temperatures measured by satellite give comprehensive geographic coverage. Even the satellite measurements, however, contain short and medium-term fluctuations greater than the slight warming trends calculated from them. The calculated trends vary significantly as a function of the most recent fluctuations and the lengths of the data sets, which are short.

Figure 3 shows the latter part of the period of warming from the Little Ice Age in greater detail by means of Arctic air temperature as compared with solar irradiance, as does Figure 5 for U.S. surface temperature. There is a close correlation between solar activity and temperature and none between hydrocarbon use and temperature. Several other studies over a wide variety of time intervals have found similar correlations between climate and solar activity (15, 34-39).

Figure 3 also illustrates the uncertainties introduced by limited time records. If the Arctic air temperature data before 1920 were not available, essentially no uptrend would be observed.

This observed variation in solar activity is typical of stars close in size and age to the sun (40). The current warming trends on Mars (41), Jupiter (42), Neptune (43,44), Neptune's moon Triton (45), and Pluto (46-48) may result, in part, from similar relations to the sun and its activity – like those that are warming the Earth.

Hydrocarbon use and atmospheric CO_2 do not correlate with the observed temperatures. Solar activity correlates quite well. Correlation does not prove causality, but non-correlation proves non-causality. Human hydrocarbon use is not measurably warming the earth. Moreover, there is a robust theoretical and empirical model for solar warming and cooling of the Earth (8,19,49,50). The experimental data do not prove that solar activity is the only phenomenon responsible for substantial Earth temperature fluctuations, but they do show that human hydrocarbon use is not among those phenomena.

The overall experimental record is self-consistent. The Earth has been warming as it recovers from the Little Ice Age at an average rate of about 0.5 ºC per century. Fluctuations within this temperature trend include periods of more rapid increase and also periods of temperature decrease. These fluctuations correlate well with concomitant fluctuations in the activity of the sun. Neither the trends nor the fluctuations within the trends correlate with hydrocarbon use. Sea level and glacier length reveal three intermediate uptrends and two downtrends since 1800, as does solar activity. These trends are climatically benign and result from natural processes.

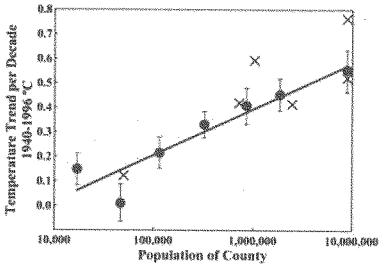

Figure 15: Surface temperature trends for 1940 to 1996 from 107 measuring stations in 49 California counties (51,52). The trends were combined for counties of similar population and plotted with the standard errors of their means. The six measuring stations in Los Angeles County were used to calculate the standard error of that county, which is plotted at a population of 8.9 million. The "urban heat island effect" on surface measurements is evident. The straight line is a least-squares fit to the closed circles. The points marked "X" are the six unadjusted station records selected by NASA GISS (53-55) for use in their estimate of global surface temperatures. Such selections make NASA GISS temperatures too high.

ATMOSPHERIC CARBON DIOXIDE

The concentration of CO_2 in Earth's atmosphere has increased during the past century, as shown in Figure 17. The magnitude of this atmospheric increase is currently about 4 gigatons (Gt C) of carbon per year. Total human industrial CO_2 production, primarily from use of coal, oil, and natural gas and the production of cement, is currently about 8 Gt C per year (7,56,57). Humans also exhale about 0.6 Gt C per year, which has been sequestered by plants from atmospheric CO_2. Office air concentrations often exceed 1,000 ppm CO_2.

To put these figures in perspective, it is estimated that the atmosphere contains 780 Gt C; the surface ocean contains 1,000 Gt C; vegetation, soils, and detritus contain 2,000 Gt C; and the intermediate and deep oceans contain 38,000 Gt C, as CO_2 or CO_2 hydration products. Each year, the surface ocean and atmosphere exchange an estimated 90 Gt C; vegetation and the atmosphere, 100 Gt C; marine biota and the surface ocean, 50 Gt C; and the surface ocean and the intermediate and deep oceans, 40 Gt C (56,57).

So great are the magnitudes of these reservoirs, the rates of exchange between them, and the uncertainties of these estimated numbers that the sources of the recent rise in atmospheric CO_2 have not been determined with certainty (58,59). Atmospheric concentrations of CO_2 are reported to have varied widely over geological time, with peaks, according to some estimates, some 20-fold higher than at present and lows at approximately 200 ppm (60-62).

Ice-core records are reported to show seven extended periods during 650,000 years in which CO_2, methane (CH_4), and temperature increased and then decreased (63-65). Ice-core records contain substantial uncertainties (58), so these correlations are imprecise.

In all seven glacial and interglacial cycles, the reported changes in CO_2 and CH_4 lagged the temperature changes and could not, therefore, have caused them (66). These fluctuations probably involved temperature-caused changes in oceanic and terrestrial CO_2 and CH_4 content. More recent CO_2 fluctuations also lag temperature (67,68).

In 1957, Revelle and Seuss (69) estimated that temperature-caused out-gassing of ocean CO_2 would increase atmospheric

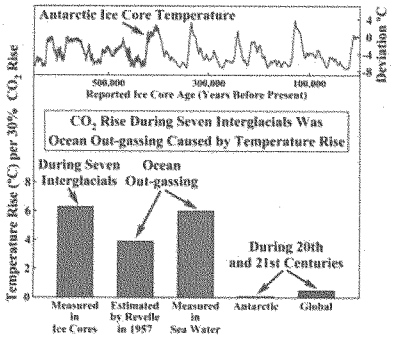

Figure 16: Temperature rise versus CO_2 rise from seven ice-core measured interglacial periods (63-65); from calculations (69) and measurements (70) of sea water out-gassing; and as measured during the 20th and 21st centuries (10,72). The interglacial temperature increases caused the CO_2 rises through release of ocean CO_2. The CO_2 rises did not cause the temperature rises.

In addition to the agreement between the out-gassing estimates and measurements, this conclusion is also verified by the small temperature rise during the 20th and 21st centuries. If the CO_2 versus temperature correlation during the seven interglacials had been caused by CO_2 greenhouse warming, then the temperature rise per CO_2 rise would have been as high during the 20th and 21st centuries as it was during the seven interglacial periods.

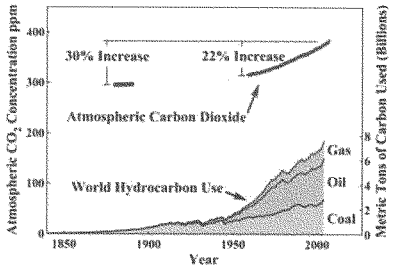

Figure 17: Atmospheric CO_2 concentrations in parts per million by volume, ppm, measured spectrophotometrically at Mauna Loa, Hawaii, between 1958 and 2007. These measurements agree well with those at other locations (71). Data before 1958 are from ice cores and chemical analyses, which have substantial experimental uncertainties. We have used 295 ppm for the period 1880 to 1890, which is an average of the available estimates. About 0.6 Gt C of CO_2 is produced annually by human respiration and often leads to concentrations exceeding 1,000 ppm in public buildings. Atmospheric CO_2 has increased 22% since 1958 and about 30% since 1880.

CO_2 by about 7% per °C temperature rise. The reported change during the seven interglacials of the 650,000-year ice core record is about 5% per °C (63), which agrees with the out-gassing calculation.

Between 1900 and 2006, Antarctic CO_2 increased 30% per 0.1 °C temperature change (72), and world CO_2 increased 30% per 0.5 °C. In addition to ocean out-gassing, CO_2 from human use of hydrocarbons is a new source. Neither this new source nor the older natural CO_2 sources are causing atmospheric temperature to change.

The hypothesis that the CO_2 rise during the interglacials caused the temperature to rise requires an increase of about 6 °C per 30% rise in CO_2 as seen in the ice core record. If this hypothesis were correct, Earth temperatures would have risen about 6 °C between 1900 and 2006, rather than the rise of between 0.1 °C and 0.5 °C, which actually occurred. This difference is illustrated in Figure 16.

The 650,000-year ice-core record does not, therefore, agree with the hypothesis of "human-caused global warming," and, in fact, provides empirical evidence that invalidates this hypothesis.

Carbon dioxide has a very short residence time in the atmosphere. Beginning with the 7 to 10-year half-time of CO_2 in the atmosphere estimated by Revelle and Seuss (69), there were 36 estimates of the atmospheric CO_2 half-time based upon experimental measurements published between 1957 and 1992 (59). These range between 2 and 25 years, with a mean of 7.5, a median of 7.6, and an upper range average of about 10. Of the 36 values, 33 are 10 years or less.

Many of these estimates are from the decrease in atmospheric carbon 14 after cessation of atmospheric nuclear weapons testing, which provides a reliable half-time. There is no experimental evidence to support computer model estimates (73) of a CO_2 atmospheric "lifetime" of 300 years or more.

Human production of 8 Gt C per year of CO_2 is negligible as compared with the 40,000 Gt C residing in the oceans and biosphere. At ultimate equilibrium, human-produced CO_2 will have an insignificant effect on the amounts in the various reservoirs. The rates of approach to equilibrium are, however, slow enough that human use creates a transient atmospheric increase.

In any case, the sources and amounts of CO_2 in the atmosphere are of secondary importance to the hypothesis of "human-caused global warming." It is human burning of coal, oil, and natural gas that is at issue. CO_2 is merely an intermediate in a hypothetical mechanism by which this "human-caused global warming" is said to take place. The amount of atmospheric CO_2 does have profound environmental effects on plant and animal populations (74) and diversity, as is discussed below.

CLIMATE CHANGE

While the average temperature change taking place as the Earth recovers from the Little Ice Age is so slight that it is difficult to discern, its environmental effects are measurable. Glacier shortening and the 7 inches per century rise in sea level are examples. There are additional climate changes that are correlated with this rise in temperature and may be caused by it.

Greenland, for example, is beginning to turn green again, as it was 1,000 years ago during the Medieval Climate Optimum (11). Arctic sea ice is decreasing somewhat (75), but Antarctic ice is not decreasing and may be increasing, due to increased snow (76-79).

In the United States, rainfall is increasing at about 1.8 inches per century, and the number of severe tornados is decreasing, as shown in Figures 7 and 8. If world temperatures continue to rise at the current rate, they will reach those of the Medieval Climate Optimum about 2 centuries from now. Historical reports of that period record the growing of warm weather crops in localities too cold for that purpose today, so it is to be expected that the area of more temperate climate will expand as it did then. This is already being observed, as studies at higher altitudes have reported increases in amount and diversity of plant and animal life by more than 50% (12,80).

Atmospheric temperature is increasing more in the Northern Hemisphere than in the Southern, with intermediate periods of increase and decrease in the overall trends.

There has been no increase in frequency or severity of Atlantic hurricanes during the period of 6-fold increase in hydrocarbon use, as is illustrated in Figures 9 and 10. Numbers of violent hurricanes vary greatly from year to year and are no greater now than they were 50 years ago. Similarly, maximum wind speeds have not increased.

All of the observed climate changes are gradual, moderate, and entirely within the bounds of ordinary natural changes that have occurred during the benign period of the past few thousand years.

There is no indication whatever in the experimental data that an abrupt or remarkable change in any of the ordinary natural climate variables is beginning or will begin to take place.

GLOBAL WARMING HYPOTHESIS

The greenhouse effect amplifies solar warming of the earth. Greenhouse gases such as H_2O, CO_2, and CH_4 in the Earth's atmosphere, through combined convective readjustments and the radiative blanketing effect, essentially decrease the net escape of terrestrial thermal infrared radiation. Increasing CO_2, therefore, effectively increases radiative energy input to the Earth's atmosphere. The path of this radiative input is complex. It is redistributed, both vertically and horizontally, by various physical processes, including advection, convection, and diffusion in the atmosphere and ocean.

When an increase in CO_2 increases the radiative input to the atmosphere, how and in which direction does the atmosphere respond? Hypotheses about this response differ and are schematically shown in Figure 18. Without the water-vapor greenhouse effect, the Earth would be about 14 °C cooler (81). The radiative contribution of doubling atmospheric CO_2 is minor, but this radiative greenhouse effect is treated quite differently by different climate hypotheses. The hypotheses that the IPCC (82,83) has chosen to adopt predict that the effect of CO_2 is amplified by the atmosphere, especially by water vapor, to produce a large temperature increase. Other hypotheses, shown as hypothesis 2, predict the opposite – that the atmospheric response will counteract the CO_2 increase and result in insignificant changes in global temperature (81,84,85,91,92). The experimental evidence, as described above, favors hypothesis 2. While CO_2 has increased substantially, its effect on temperature has been so slight that it has not been experimentally detected.

The computer climate models upon which "human-caused global warming" is based have substantial uncertainties and are markedly unreliable. This is not surprising, since the climate is a coupled,

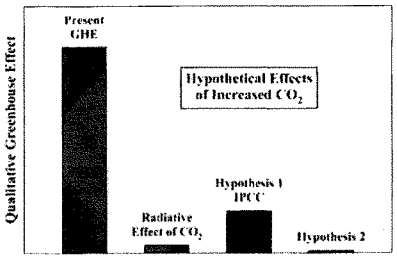

Figure 18: Qualitative illustration of greenhouse warming. "Present GHE" is the current greenhouse effect from all atmospheric phenomena. "Radiative effect of CO_2" is the added greenhouse radiative effect from doubling CO_2 without consideration of other atmospheric components. "Hypothesis 1 IPCC" is the hypothetical amplification effect assumed by IPCC. "Hypothesis 2" is the hypothetical moderation effect.

non-linear dynamical system. It is very complex. Figure 19 illustrates the difficulties by comparing the radiative CO_2 greenhouse effect with correction factors and uncertainties in some of the parameters in the computer climate calculations. Other factors, too, such as the chemical and climatic influence of volcanoes, cannot now be reliably computer modeled.

In effect, an experiment has been performed on the Earth during the past half-century – an experiment that includes all of the complex factors and feedback effects that determine the Earth's temperature and climate. Since 1940, hydrocarbon use has risen 6-fold. Yet, this rise has had no effect on the temperature trends, which have continued their cycle of recovery from the Little Ice Age in close correlation with increasing solar activity.

Not only has the global warming hypothesis failed experimental tests, it is theoretically flawed as well. It can reasonably be argued that cooling from negative physical and biological feedbacks to greenhouse gases nullifies the slight initial temperature rise (84,86).

The reasons for this failure of the computer climate models are subjects of scientific debate (87). For example, water vapor is the largest contributor to the overall greenhouse effect (88). It has been suggested that the climate models treat feedbacks from clouds, water vapor, and related hydrology incorrectly (85,89-92).

The global warming hypothesis with respect to CO_2 is not based upon the radiative properties of CO_2 itself, which is a very weak greenhouse gas. It is based upon a small initial increase in temperature caused by CO_2 and a large theoretical amplification of that temperature increase, primarily through increased evaporation of H_2O, a

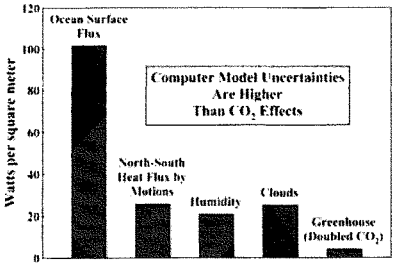

Figure 19: The radiative greenhouse effect of doubling the concentration of atmospheric CO_2 (right bar) as compared with four of the uncertainties in the computer climate models (87,93).

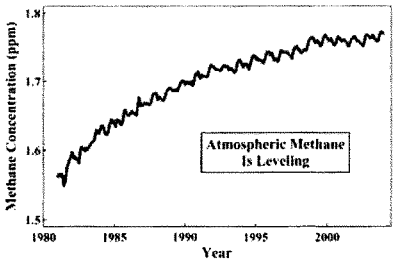

Figure 20: Global atmospheric methane concentration in parts per million between 1982 and 2004 (94).

strong greenhouse gas. Any comparable temperature increase from another cause would produce the same calculated outcome.

Thus, the 3,000-year temperature record illustrated in Figure 1 also provides a test of the computer models. The historical temperature record shows that the Earth has previously warmed far more than could be caused by CO_2 itself. Since these past warming cycles have not initiated water-vapor-mediated atmospheric warming catastrophes, it is evident that weaker effects from CO_2 cannot do so.

Methane is also a minor greenhouse gas. World CH_4 levels are, as shown in Figure 20, leveling off. In the U.S. in 2005, 42% of human-produced methane was from hydrocarbon energy production, 28% from waste management, and 30% from agriculture (95). The total amount of CH_4 produced from these U.S. sources decreased 7% between 1980 and 2005. Moreover, the record shows that, even while methane was increasing, temperature trends were benign.

The "human-caused global warming" – often called the "global warming" – hypothesis depends entirely upon computer model-generated scenarios of the future. There are no empirical records that verify either these models or their flawed predictions (96).

Claims (97) of an epidemic of insect-borne diseases, extensive species extinction, catastrophic flooding of Pacific islands, ocean acidification, increased numbers and severities of hurricanes and tornados, and increased human heat deaths from the 0.5 °C per century temperature rise are not consistent with actual observations. The "human-caused global warming" hypothesis and the computer calculations that support it are in error. They have no empirical support and are invalidated by numerous observations.

WORLD TEMPERATURE CONTROL

World temperature is controlled by natural phenomena. What steps could mankind take if solar activity or other effects began to shift the Earth toward temperatures too cold or too warm for optimum human life?

First, it would be necessary to determine what temperature humans feel is optimum. It is unlikely that the chosen temperature would be exactly that which we have today. Second, we would be fortunate if natural forces were to make the Earth too warm rather than too cold because we can cool the Earth with relative ease. We have no means by which to warm it. Attempting to warm the Earth with addition of CO_2 or to cool the Earth by restrictions of CO_2 and hydrocarbon use would, however, be futile. Neither would work.

Inexpensively blocking the sun by means of particles in the upper atmosphere would be effective. S.S. Penner, A.M. Schneider, and E. M. Kennedy have proposed (98) that the exhaust systems of commercial airliners could be tuned in such a way as to eject particulate sun-blocking material into the upper atmosphere. Later, Edward Teller similarly suggested (18) that particles could be injected into the atmosphere in order to reduce solar heating and cool the Earth. Teller estimated a cost of between $500 million and $1 billion per year for between 1 °C and 3 °C of cooling. Both methods use particles so small that they would be invisible from the Earth.

These methods would be effective and economical in blocking solar radiation and reducing atmospheric and surface temperatures. There are other similar proposals (99). World energy rationing, on the other hand, would not work.

The climate of the Earth is now benign. If temperatures become too warm, this can easily be corrected. If they become too cold, we have no means of response – except to maximize nuclear and hydrocarbon energy production and technological advance. This would help humanity adapt and might lead to new mitigation technology.

FERTILIZATION OF PLANTS BY CO_2

How high will the CO_2 concentration of the atmosphere ultimately rise if mankind continues to increase the use of coal, oil, and natural gas? At ultimate equilibrium with the ocean and other reservoirs there will probably be very little increase. The current rise is a non-equilibrium result of the rate of approach to equilibrium.

One reservoir that would moderate the increase is especially important. Plant life provides a large sink for CO_2. Using current knowledge about the increased growth rates of plants and assuming increased CO_2 release as compared to current emissions, it has been estimated that atmospheric CO_2 levels may rise to about 600 ppm before leveling off. At that level, CO_2 absorption by increased Earth biomass is able to absorb about 10 Gt C per year (100). At present, this absorption is estimated to be about 3 Gt C per year (57).

About 30% of this projected rise from 295 to 600 ppm has already taken place, without causing unfavorable climate changes. Moreover, the radiative effects of CO_2 are logarithmic (101,102), so more than 40% of any climatic influences have already occurred.

As atmospheric CO_2 increases, plant growth rates increase. Also, leaves transpire less and lose less water as CO_2 increases, so that plants are able to grow under drier conditions. Animal life, which depends upon plant life for food, increases proportionally.

Figures 21 to 24 show examples of experimentally measured increases in the growth of plants. These examples are representative of a very large research literature on this subject (103-109). As Figure 21 shows, long-lived 1,000- to 2,000-year-old pine trees have shown a sharp increase in growth during the past half-century. Figure 22 shows the 40% increase in the forests of the United States that has

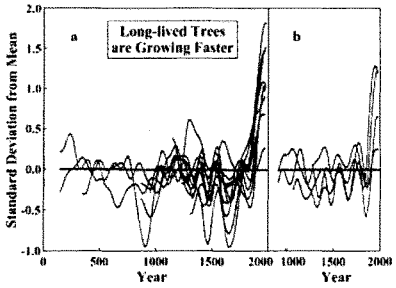

Figure 21: Standard deviation from the mean of tree ring widths for (a) bristlecone pine, limber pine, and fox tail pine in the Great Basin of California, Nevada, and Arizona and (b) bristlecone pine in Colorado (110). Tree ring widths were averaged in 20-year segments and then normalized so that the means of prior tree growth were zero. The deviations from the means are shown in units of standard deviations of those means.

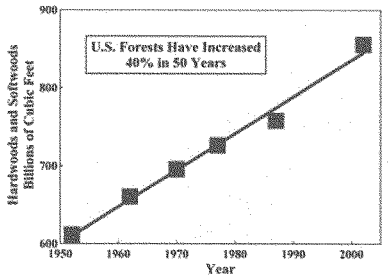

Figure 22: Inventories of standing hardwood and softwood timber in the United States compiled in *Forest Resources of the United States*, 2002, U.S. Department of Agriculture Forest Service (111,112). The linear trend cited in 1998 (1) with an increase of 30% has continued. The increase is now 40%. The amount of U.S. timber is rising almost 1% per year.

taken place since 1950. Much of this increase is due to the increase in atmospheric CO_2 that has already occurred. In addition, it has been reported that Amazonian rain forests are increasing their vegetation by about 900 pounds of carbon per acre per year (113), or approximately 2 tons of biomass per acre per year. Trees respond to CO_2 fertilization more strongly than do most other plants, but all plants respond to some extent.

Since plant response to CO_2 fertilization is nearly linear with respect to CO_2 concentration over the range from 300 to 600 ppm, as seen in Figure 23, experimental measurements at different levels of CO_2 enrichment can be extrapolated. This has been done in Figure 24 in order to illustrate CO_2 growth enhancements calculated for the atmospheric increase of about 88 ppm that has already taken place and those expected from a projected total increase of 305 ppm.

Wheat growth is accelerated by increased atmospheric CO_2, especially under dry conditions. Figure 24 shows the response of wheat grown under wet conditions versus that of wheat stressed by lack of water. The underlying data is from open-field experiments. Wheat was grown in the usual way, but the atmospheric CO_2 concentrations of circular sections of the fields were increased by arrays of computer-controlled equipment that released CO_2 into the air to hold the levels as specified (115,116). Orange and young pine tree growth enhancement (117-119) with two atmospheric CO_2 increases – that which has already occurred since 1885 and that projected for the next two centuries – is also shown. The relative growth enhancement of trees by CO_2 diminishes with age. Figure 24 shows young trees.

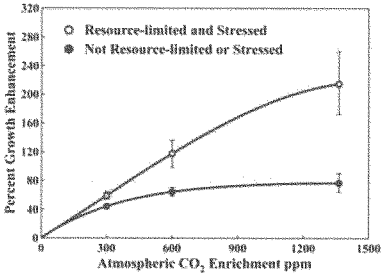

Figure 23: Summary data from 279 published experiments in which plants of all types were grown under paired stressed (open red circles) and unstressed (closed blue circles) conditions (114). There were 208, 50, and 21 sets at 300, 600, and an average of about 1350 ppm CO_2, respectively. The plant mixture in the 279 studies was slightly biased toward plant types that respond less to CO_2 fertilization than does the actual global mixture. Therefore, the figure underestimates the expected global response. CO_2 enrichment also allows plants to grow in drier regions, further increasing the response.

Figure 23 summarizes 279 experiments in which plants of various types were raised under CO_2-enhanced conditions. Plants under stress from less-than-ideal conditions – a common occurrence in nature – respond more to CO_2 fertilization. The selections of species in Figure 23 were biased toward plants that respond less to CO_2 fertilization than does the mixture actually covering the Earth, so Figure 23 underestimates the effects of global CO_2 enhancement.

Clearly, the green revolution in agriculture has already benefitted from CO_2 fertilization, and benefits in the future will be even greater. Animal life is increasing proportionally, as shown by studies of 51 terrestrial (120) and 22 aquatic ecosystems (121). Moreover, as shown by a study of 94 terrestrial ecosystems on all continents except Antarctica (122), species richness – biodiversity – is more positively correlated with productivity – the total quantity of plant life per acre – than with anything else.

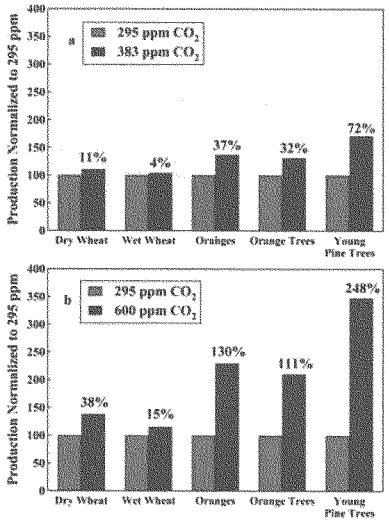

Figure 24: Calculated (1,2) growth rate enhancement of wheat, young orange trees, and very young pine trees already taking place as a result of atmospheric enrichment by CO_2 from 1885 to 2007 (a), and expected as a result of atmospheric enrichment by CO_2 to a level of 600 ppm (b).

Atmospheric CO_2 is required for life by both plants and animals. It is the sole source of carbon in all of the protein, carbohydrate, fat, and other organic molecules of which living things are constructed.

Plants extract carbon from atmospheric CO_2 and are thereby fertilized. Animals obtain their carbon from plants. Without atmospheric CO_2, none of the life we see on Earth would exist.

Water, oxygen, and carbon dioxide are the three most important substances that make life possible.

They are surely not environmental pollutants.

ENVIRONMENT AND ENERGY

The single most important human component in the preservation of the Earth's environment is energy. Industrial conversion of energy into forms that are useful for human activities is the most important aspect of technology. Abundant inexpensive energy is required for the prosperous maintenance of human life and the continued advance of life-enriching technology. People who are prosperous have the wealth required to protect and enhance their natural environment.

Currently, the United States is a net importer of energy as shown in Figure 25. Americans spend about $300 billion per year for imported oil and gas – and an additional amount for military expenses related to those imports.

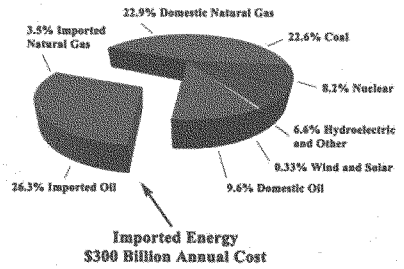

Figure 25: In 2006, the United States obtained 84.9% of its energy from hydrocarbons, 8.2% from nuclear fuels, 2.9% from hydroelectric dams, 2.1% from wood, 0.8% from biofuels, 0.4% from waste, 0.3% from geothermal, and 0.3% from wind and solar radiation. The U.S. uses 21 million barrels of oil per day – 27% from OPEC, 17% from Canada and Mexico, 16% from others, and 40% produced in the U.S. (95). The cost of imported oil and gas at $60 per barrel and $7 per 1,000 ft^3 in 2007 is about $300 billion per year.

Political calls for a reduction of U.S. hydrocarbon use by 90% (123), thereby eliminating 75% of America's energy supply, are obviously impractical. Nor can this 75% of U.S. energy be replaced by alternative "green" sources. Despite enormous tax subsidies over the past 30 years, green sources still provide only 0.3% of U.S. energy.

Yet, the U.S. clearly cannot continue to be a large net importer of energy without losing its economic and industrial strength and its political independence. It should, instead, be a net exporter of energy.

There are three realistic technological paths to American energy independence – increased use of hydrocarbon energy, nuclear energy, or both. There are no climatological impediments to increased use of hydrocarbons, although local environmental effects can and must be accommodated. Nuclear energy is, in fact, less expensive and more environmentally benign than hydrocarbon energy, but it too has been the victim of the politics of fear and claimed disadvantages and dangers that are actually negligible.

For example, the "problem" of high-level "nuclear waste" has been given much attention, but this problem has been politically created by U.S. government barriers to American fuel breeding and reprocessing. Spent nuclear fuel can be recycled into new nuclear fuel. It need not be stored in expensive repositories.

Reactor accidents are also much publicized, but there has never been even one human death associated with an American nuclear reactor incident. By contrast, American dependence on automobiles results in more than 40,000 human deaths per year.

All forms of energy generation, including "green" methods, entail industrial deaths in the mining, manufacture, and transport of resources they require. Nuclear energy requires the smallest amount of such resources (124) and therefore has the lowest risk of deaths.

Estimated relative costs of electrical energy production vary with geographical location and underlying assumptions. Figure 26 shows a recent British study, which is typical. At present, 43% of U.S. energy consumption is used for electricity production.

To be sure, future inventions in energy technology may alter the relative economics of nuclear, hydrocarbon, solar, wind, and other methods of energy generation. These inventions cannot, however, be forced by political fiat, nor can they be wished into existence. Alternatively, "conservation," if practiced so extensively as to be an alternative to hydrocarbon and nuclear power, is merely a politically correct word for "poverty."

The current untenable situation in which the United States is losing $300 billion per year to pay for foreign oil and gas is not the result of failures of government energy production efforts. The U.S. government does not produce energy. Energy is produced by private industry. Why then has energy production thrived abroad while domestic production has stagnated?

This stagnation has been caused by United States government taxation, regulation, and sponsorship of litigation, which has made the U.S. a very unfavorable place to produce energy. In addition, the U.S. government has spent vast sums of tax money subsidizing inferior energy technologies for political purposes.

It is not necessary to discern in advance the best course to follow. Legislative repeal of taxation, regulation, incentives to litigation, and repeal of all subsidies of energy generation industries would stimulate industrial development, wherein competition could then automatically determine the best paths.

Nuclear power is safer, less expensive, and more environmentally benign than hydrocarbon power, so it is probably the better choice for increased energy production. Solid, liquid and gaseous hydrocarbon fuels provide, however, many conveniences, and a national infrastructure to use them is already in place. Oil from shale or coal liquefaction is less expensive than crude oil at current prices, but its ongoing production costs are higher than those for already developed oil fields. There is, therefore, an investment risk that crude oil prices could drop so low that liquefaction plants could not compete. Nuclear energy does not have this disadvantage, since the operating costs of nuclear power plants are very low.

Figure 27 illustrates, as an example, one practical and environmentally sound path to U.S. energy independence. At present 19% of U.S. electricity is produced by 104 nuclear power reactors with an average generating output in 2006 of 870 megawatts per reactor, for a total of about 90 GWe (gigawatts) (125). If this were increased by 560 GWe, nuclear power could fill all current U.S. electricity requirements and have 230 GWe left over for export as electricity or as hydrocarbon fuels replaced or manufactured.

Thus, rather than a $300 billion trade loss, the U.S. would have a $200 billion trade surplus – and installed capacity for future U.S. re-

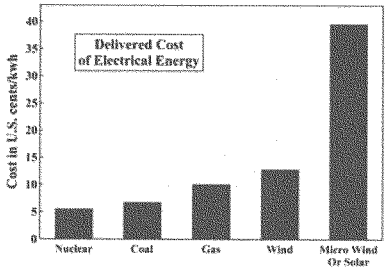

Figure 26: Delivered cost per kilowatt hour of electrical energy in Great Britain in 2006, without CO_2 controls (126). These estimates include all capital and operational expenses for a period of 50 years. Micro wind or solar are units installed for individual homes.

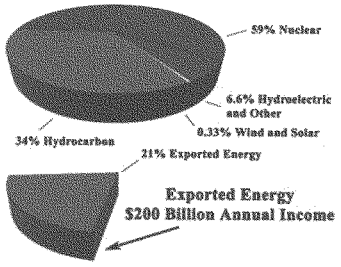

Figure 27: Construction of one Palo Verde installation with 10 reactors in each of the 50 states. Energy trade deficit is reversed by $500 billion per year, resulting in a $200 billion annual surplus. Currently, this solution is not possible owing to misguided government policies, regulations, and taxation and to legal maneuvers available to anti-nuclear activists. These impediments should be legislatively repealed.

quirements. Moreover, if heat from additional nuclear reactors were used for coal liquefaction and gasification, the U.S. would not even need to use its oil resources. The U.S. has about 25% of the world's coal reserves. This heat could also liquify biomass, trash, or other sources of hydrocarbons that might eventually prove practical.

The Palo Verde nuclear power station near Phoenix, Arizona, was originally intended to have 10 nuclear reactors with a generating capacity of 1,243 megawatts each. As a result of public hysteria caused by false information -- very similar to the human-caused global warming hysteria being spread today, construction at Palo Verde was stopped with only three operating reactors completed. This installation is sited on 4,000 acres of land and is cooled by waste water from the city of Phoenix, which is a few miles away. An area of 4,000 acres is 6.25 square miles or 2.5 miles square. The power station itself occupies only a small part of this total area.

If just one station like Palo Verde were built in each of the 50 states and each installation included 10 reactors as originally planned for Palo Verde, these plants, operating at the current 90% of design capacity, would produce 560 GWe of electricity. Nuclear technology has advanced substantially since Palo Verde was built, so plants constructed today would be even more reliable and efficient.

Assuming a construction cost of $2.3 billion per 1,200 MWe reactor (127) and 15% economies of scale, the total cost of this entire project would be $1 trillion, or 4 months of the current U.S. federal budget. This is 8% of the annual U.S. gross domestic product. Construction costs could be repaid in just a few years by the capital now spent by the people of the United States for foreign oil and by the change from U.S. import to export of energy.

The 50 nuclear installations might be sited on a population basis. If so, California would have six, while Oregon and Idaho together would have one. In view of the great economic value of these facilities, there would be vigorous competition for them.

In addition to these power plants, the U.S. should build fuel reprocessing capability, so that spent nuclear fuel can be reused. This would lower fuel cost and eliminate the storage of high-level nuclear waste. Fuel for the reactors can be assured for 1,000 years (128) by using both ordinary reactors with high breeding ratios and specific breeder reactors, so that more fuel is produced than consumed.

About 33% of the thermal energy in an ordinary nuclear reactor is converted to electricity. Some new designs are as high as 48%. The heat from a 1,243 MWe reactor can produce 38,000 barrels of coal-derived oil per day (129). With one additional Palo Verde installation in each state for oil production, the yearly output would be at least 7 billion barrels per year with a value, at $60 per barrel, of more than $400 billion per year. This is twice the oil production of Saudi Arabia. Current proven coal reserves of the United States are sufficient to sustain this production for 200 years (128). This liquified coal exceeds the proven oil reserves of the entire world. The reactors could produce gaseous hydrocarbons from coal, too.

The remaining heat from nuclear power plants could warm air or water for use in indoor climate control and other purposes.

Nuclear reactors can also be used to produce hydrogen, instead of oil and gas (130,131). The current cost of production and infrastructure is, however, much higher for hydrogen than for oil and gas. Technological advance reduces cost, but usually not abruptly. A prescient call in 1800 for the world to change from wood to methane would have been impracticably ahead of its time, as may be a call today for an abrupt change from oil and gas to hydrogen. In distinguishing the practical from the futuristic, a free market in energy is absolutely essential.

Surely these are better outcomes than are available through international rationing and taxation of energy as has been recently proposed (82,83,97,123). This nuclear energy example demonstrates that current technology can produce abundant inexpensive energy if it is not politically suppressed.

There need be no vast government program to achieve this goal. It could be reached simply by legislatively removing all taxation, most regulation and litigation, and all subsidies from all forms of energy production in the U.S., thereby allowing the free market to build the most practical mixture of methods of energy generation.

With abundant and inexpensive energy, American industry could be revitalized, and the capital and energy required for further industrial and technological advance could be assured. Also assured would be the continued and increased prosperity of all Americans.

The people of the United States need more low-cost energy, not less. If this energy is produced in the United States, it can not only become a very valuable export, but it can also ensure that American industry remains competitive in world markets and that hoped-for American prosperity continues and grows.

In this hope, Americans are not alone. Across the globe, billions of people in poorer nations are struggling to improve their lives. These people need abundant low-cost energy, which is the currency of technological progress.

In newly developing countries, that energy must come largely from the less technologically complicated hydrocarbon sources. It is a moral imperative that this energy be available. Otherwise, the efforts of these peoples will be in vain, and they will slip backwards into lives of poverty, suffering, and early death.

Energy is the foundation of wealth. Inexpensive energy allows people to do wonderful things. For example, there is concern that it may become difficult to grow sufficient food on the available land. Crops grow more abundantly in a warmer, higher CO_2 environment, so this can mitigate future problems that may arise (12).

Energy provides, however, an even better food insurance plan. Energy-intensive hydroponic greenhouses are 2,000 times more productive per unit land area than are modern American farming methods (132). Therefore, if energy is abundant and inexpensive, there is no practical limit to world food production.

Fresh water is also believed to be in short supply. With plentiful inexpensive energy, sea water desalination can provide essentially unlimited supplies of fresh water.

During the past 200 years, human ingenuity in the use of energy has produced many technological miracles. These advances have markedly increased the quality, quantity, and length of human life. Technologists of the 21st century need abundant, inexpensive energy with which to continue this advance.

Were this bright future to be prevented by world energy rationing, the result would be tragic indeed. In addition to human loss, the Earth's environment would be a major victim of such a mistake. Inexpensive energy is essential to environmental health. Prosperous people have the wealth to spare for environmental preservation and enhancement. Poor, impoverished people do not.

CONCLUSIONS

There are no experimental data to support the hypothesis that increases in human hydrocarbon use or in atmospheric carbon dioxide and other greenhouse gases are causing or can be expected to cause unfavorable changes in global temperatures, weather, or landscape. There is no reason to limit human production of CO_2, CH_4, and other minor greenhouse gases as has been proposed (82,83,97,123).

We also need not worry about environmental calamities even if the current natural warming trend continues. The Earth has been much warmer during the past 3,000 years without catastrophic effects. Warmer weather extends growing seasons and generally improves the habitability of colder regions.

As coal, oil, and natural gas are used to feed and lift from poverty vast numbers of people across the globe, more CO_2 will be released into the atmosphere. This will help to maintain and improve the health, longevity, prosperity, and productivity of all people.

The United States and other countries need to produce more energy, not less. The most practical, economical, and environmentally sound methods available are hydrocarbon and nuclear technologies.

Human use of coal, oil, and natural gas has not harmfully warmed the Earth, and the extrapolation of current trends shows that it will not do so in the foreseeable future. The CO_2 produced does, however, accelerate the growth rates of plants and also permits plants to grow in drier regions. Animal life, which depends upon plants, also flourishes, and the diversity of plant and animal life is increased.

Human activities are producing part of the rise in CO_2 in the atmosphere. Mankind is moving the carbon in coal, oil, and natural gas from below ground to the atmosphere, where it is available for conversion into living things. We are living in an increasingly lush environment of plants and animals as a result of this CO_2 increase. Our children will therefore enjoy an Earth with far more plant and animal life than that with which we now are blessed.

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Manhattan Declaration on Climate Change

"Global warming" is not a global crisis

We, the scientists and researchers in climate and related fields, economists, policymakers, and business leaders, assembled at Times Square, New York City, participating in the 2008 International Conference on Climate Change,

Resolving that scientific questions should be evaluated solely by the scientific method;

Affirming that global climate has always changed and always will, independent of the actions of humans, and that carbon dioxide (CO2) is not a pollutant but rather a necessity for all life;

Recognising that the causes and extent of recently-observed climatic change are the subject of intense debates in the climate science community and that oft-repeated assertions of a supposed 'consensus' among climate experts are false;

Affirming that attempts by governments to legislate costly regulations on industry and individual citizens to encourage CO2 emission reduction will slow development while having no appreciable impact on the future trajectory of global climate change. Such policies will markedly diminish future prosperity and so reduce the ability of societies to adapt to inevitable climate change, thereby increasing, not decreasing human suffering;

Noting that warmer weather is generally less harmful to life on Earth than colder:

Hereby declare:

That current plans to restrict anthropogenic CO2 emissions are a dangerous misallocation of intellectual capital and resources that should be dedicated to solving humanity's real and serious problems.

That there is no convincing evidence that CO2 emissions from modern industrial activity has in the past, is now, or will in the future cause catastrophic climate change.

That attempts by governments to inflict taxes and costly regulations on industry and individual citizens with the aim of reducing emissions of CO2 will pointlessly curtail the prosperity of the West and progress of developing nations without affecting climate.

That adaptation as needed is massively more cost-effective than any attempted mitigation, and that a focus on such mitigation will divert the attention and resources of governments away from addressing the real problems of their peoples.

That human-caused climate change is not a global crisis.

Now, therefore, we recommend –

That world leaders reject the views expressed by the United Nations Intergovernmental Panel on Climate Change as well as popular, but misguided works such as "An Inconvenient Truth".

That all taxes, regulations, and other interventions intended to reduce emissions of CO2 be abandoned forthwith.

Agreed at New York, 4 March 2008.

To see the 1,100+ signatories to the Manhattan Declaration, please visit http://www.climatescienceinternational.org/

The CHAIRMAN. Thank you, Mr. Carey. And our final witness is Mr. Preston Chiaro. He is the Chief Executive for Technology and Innovation for Rio Tinto. Rio Tinto is the largest diversified mining company in the United States and the third largest mining and exploration company in the world. Rio Tinto also holds a 48 percent interest in Cloud Peak Energy, which is the third largest coal company in the United States.

We welcome you, Mr. Chiaro. Whenever you feel comfortable, please begin.

STATEMENT OF PRESTON CHIARO

Mr. CHIARO. Chairman Markey, distinguished members, first, thank you for inviting me to testify today on the role of coal in a new energy age. And like my fellow miners on behalf of the employees of Rio Tinto I wish to extend our thoughts and sympathy to the families of the miners who lost their lives in West Virginia last week.

As you said, my name is Preston Chiaro. I am the group executive for technology and innovation for Rio Tinto. Rio is the largest diversified mining company in the U.S. and one of the largest diversified mining companies in the world. Our U.S. assets include coal holdings in Colorado, copper in Utah, nickel and copper projects in Michigan and Arizona, borates in California, talc in Montana and Vermont, as well as an aluminum smelter in Kentucky. We have nearly 5,000 U.S. employees all told.

As you also mentioned we hold a 48-percent interest in Cloud Peak Energy, formally known as Rio Tinto Energy America, the third largest coal company here in the U.S. We are also one of the largest coal producers and exporters in Australia, and we also happen to be a major uranium producer.

Rio Tinto established its climate change position in 1998. We recognize that manmade emissions of greenhouse gases are contributing to global climate change and that action is necessary to reduce those emissions and to adapt to a changing climate.

As a coal producer, a large energy consumer, and a technology developer, Rio Tinto continues to devote resources and funds to the development of low emission coal technology, in particular carbon capture and storage, or CCS, technology. This technology affords coal and eventually natural gas a tremendous opportunity to position itself as a low carbon energy source both in the U.S. and globally.

In 2007, we launched the hydrogen energy joint venture with BPO Alternative Energy. Through the hydrogen energy California project in Kern County, California we are developing the first full scale, fossil fueled electricity plant to capture and store up to 90 percent of its emissions upon deployment. Once fully operational in 2015 the plant will provide low carbon electricity to 150,000 southern California homes while permanently storing 2 million tons of CO_2 per year in a nearby oil field, creating 1,500 construction jobs and 100 permanent operational positions.

Rio Tinto believes that it is critical for the world to transition away from high emitting conventional fossil fuel electricity generation by the middle of this century. We continue to support and advocate the recommendations included in the blueprint for legisla-

tive action, developed last year by the U.S. Climate Action Partnership, of which we are a member. We have gone on record in support of their inclusion in H.R. 2454 to address the existing technical, financial, legal and regulatory bottlenecks to the commercialization of carbon capture and storage technology.

Economic modeling of U.S. Climate Action Partnership's recommendations indicates that the long run transition costs are small when climate policies are market-based and economy-wide, when forest and land-based offsets are available to contain costs, and when we allocate funding to the development of technology such as carbon capture and storage that keep coal in the energy mix. In fact, USCAP studied a wide range of economic models and they all show that U.S. economic output levels of consumption and jobs, things we all care deeply about, are virtually identical to business as usual, even years after a climate policy such as H.R. 2454 is put in place. For example, compared to business as usual the sum total impact to the general economy, household consumption, and number of jobs can be viewed as a growth delay of 8 to 9 months over 20 years and most scenarios show a delay of only a couple of months.

Mr. CHIARO [continuing]. Well-constructed policy provides the best means to address the multiple challenges facing our industry. We will either participate in the shaping of policy, or we will have the policy thrust upon us. Our experience has been that constructive participation in the policy process can yield positive outcomes on the issues most important to us. I thank you for your time.

[The statement of Mr. Chiaro follows:]

Testimony of Preston Chiaro on behalf of Rio Tinto

Before the House Select Committee on Energy Independence and Global Warming

The Role of Coal in a New Energy Age
14 April 2010

I greatly appreciate the opportunity to testify today on the role of coal in a new energy age. My name is Preston Chiaro, and I am Group Executive for Technology and Innovation for Rio Tinto, the largest diversified mining company in the US, and one of the largest diversified mining companies in the world. Our US assets include coal holdings in Colorado, copper in Utah, nickel and copper projects in Michigan and Arizona, borates in California and talc in Montana and Vermont, as well as an aluminum smelter in Kentucky, with nearly 5,000 US employees all told. We also hold a 48 percent interest in Cloud Peak Energy, which until being spun off last November was known as Rio Tinto Energy America and is the third-largest coal company in the US. We are one of the largest coal producers and exporters in Australia.

Rio Tinto has had a climate change position since 1998. We recognize that man-made emissions of greenhouse gases are contributing to global climate change and that action is necessary to reduce those emissions and adapt to a changing climate. Our climate policy objectives have three dimensions. First, we actively engage with governments and encourage government action to manage greenhouse gas emissions. Second, we take an active, pragmatic, and transparent approach towards achieving energy and greenhouse gas reductions from our own operations. Third, we identify emission reduction opportunities for our products in use.

Rio Tinto's global greenhouse gas emissions totaled 41 million tons in 2009, but emissions from the use of our products were more than an order of magnitude greater, so this issue is vitally important for our customers as well. For example, last year 120 million tons of CO2 were emitted from our coal as it was used in the generation of electricity and the fabrication of steel, and another 330 million tons of CO2 emissions were associated with customers using our iron ore to produce steel.

Society needs abundant, affordable, environmentally acceptable energy to underpin poverty alleviation and create high standards of living. All primary energy sources - fossil fuels, nuclear, and renewables - must be tapped to meet this need. Yet economic and environmental challenges exist for all these energy types. Coal is cheap but high-carbon, natural gas is more expensive than coal, and also high in carbon emissions, so it, too, will need some means of addressing its CO2 emissions if the world is to meet substantial mid-century emissions reduction goals. Rio Tinto is a global leader in the production of uranium, but we recognize that nuclear power has high up-front costs and control of the fuel cycle is likewise expensive. Renewable energy is high-cost, intermittent, and land

intensive. There is no perfect fuel for all situations, but we need to advance them all to address both global development opportunities and the climate imperative.

As a coal producer, large energy consumer, and technology developer, Rio Tinto continues to devote resources and funds to the development of low-emission coal technology, in particular carbon capture and storage (CCS) technology. CCS technology affords coal – and, eventually, natural gas - a tremendous opportunity to position itself as a low-carbon energy source both in the US and globally.

Although the individual components of carbon capture and storage technology have been used extensively and safely for decades in different applications, they have not yet been integrated at a commercial scale in conjunction with electricity generation. In 2007, after several years of investing resources and funds to support the development of CCS technology, we launched the Hydrogen Energy joint venture with BP Alternative Energy. Through the Hydrogen Energy California (HECA) Project in Kern County, California we are developing the first utility-scale, fossil-fueled electricity plant to capture and store up to 90 percent of its emissions upon deployment. Once fully operational in 2015, the plant will provide low-carbon electricity to over 150,000 southern California homes and contribute to meeting California's power demand while permanently storing 2 million tonnes of CO2 per year in a nearby oilfield. Additionally, the project will create 1,500 construction jobs and 100 permanent operational positions. In recognition of HECA's promise for climate mitigation, the Department of Energy awarded the program a $308 million grant last year through Clean Coal Power Initiative funding.

Rio Tinto believes that it is critical for the world to transition away from high-emitting conventional fossil fuel electricity generation by the middle of this century. For both coal and natural gas, then, it will be important that the US make strong strides towards commercial deployment of CCS as early as possible.

To support this effort, Rio Tinto has worked to develop recommendations for the Administration and Congress on how to accelerate the development and deployment of CCS and the emissions reduction benefits it can deliver. We continue to support and advocate the recommendations included in Blueprint for Legislative Action developed last year by the US Climate Action Partnership. We have gone on record in support of the inclusion of these recommendations in HR2454, to address the existing technical, financial, legal and regulatory bottlenecks to the commercialization of CCS.

Economic modeling of USCAP's recommendations indicates that long-run transition costs are small when climate policies are market-based and economy-wide, when forest- and land-based offsets are available to contain costs, and when we allocate funding to the development of technologies such as carbon capture and storage that keep coal in the energy mix going forward. In fact, when economic models used by USCAP, the Energy Information Administration, and EPA, are compared to those commissioned by the American Council for Capital Formation and the National Association of Manufacturers, the findings challenge conventional wisdom because all models are basically telling us the same story. Specifically, all demonstrate that the things we should care about the

most, including our economic output, our levels of consumption, and our levels of employment are virtually identical to business-as-usual even years after a climate policy such as HR 2454 is put in place. For example, compared to business-as-usual, we reach the same level of economic growth, consumption, and employment about eight or nine months later under the worst-case modeled scenario, with most results showing a cumulative growth impact in 2030 of only a couple of months. If climate policy is market-based, an economic effect of this magnitude will be lost in the noise of normal business cycles and events, and clearly in everybody's best interests.

Of course, markets will work only with strong oversight, which we support, and assurances that all of the rules will be enforced. And, the US cannot carry out our policies in a vacuum because the climate problem we face is global. Our markets are also global, and we commend the work of Congressmen Inslee and Doyle in the House and Senator Sherrod Brown in the Senate for undertaking to develop provisions that provide transitional support to our energy-intensive, trade-exposed industries. These industries, including metal and industrial minerals markets, are at competitive risk during the period while the rest of the world puts its own policies in place. While US climate action can only contribute a share of the solution to the climate problem, our leadership is essential if other countries are to follow.

In conclusion, the choices facing coal at this time may appear unappealing to many in the industry, but we do not have the choice of going backward in time. We cannot go backward to a time when human contributions to climate change were less certain. We cannot go back to a time before state and federal legislators, regulators, investors, civil litigants, and – most importantly – the overwhelming majority of climate scientists believed it was necessary to reduce greenhouse gases from coal. A failure to adopt comprehensive federal legislation will increase both risk and uncertainty for our industry. These risks and uncertainties will increase with the passage of time and, if not addressed, will stifle investment in necessary advanced energy technology.

Well-constructed policy provides the best means to address the multiple challenges facing our industry. We will either participate in the shaping of policy or we will have the policy thrust upon us. Our own experience as a company has been that constructive participation in the policy process can yield positive outcomes on the issues which are most important to us.

Short Curriculum Vitae – Preston Chiaro

BSc (Hons) (Environmental Engineering),
MEng (Environmental Engineering)
Age 56

Skills and experience:
Preston Chiaro was appointed Group executive, Technology & Innovation in October 2009. He joined the Group in 1991 at Kennecott Utah Copper's Bingham Canyon mine as vice president, Technical Services. In 1995 he became vice president and general manager of the Boron operations in California and was chief executive of Rio Tinto Borax from 1999 to 2003. Preston then became chief executive of the Energy group and in November 2007, upon a management re-organisation, he also assumed responsibility for the Industrial Minerals group.

External appointments (current and recent):
Director of Cloud Peak Energy, 2008-2010. Director of Rössing Uranium Limited from 2004 to 2009, director of the World Coal Institute between 2003 and 2009 (chairman from 2006 to 2008), chairman of the Coal Industry Advisory Board to the International Energy Agency between 2004 and 2006, director of Energy Resources of Australia Limited between 2003 and 2006, director of Coal & Allied Industries Limited between 2003 and 2006.

The CHAIRMAN. Thank you, Mr. Chiaro, very much. The chair will now recognize himself for a round of questions. And this is for you, Mr. Chiaro, Mr. Leer, and Mr. Boyce.

You agree with the statement made by Mr. Don Blankenship of Massey Energy that "global warming is a hoax and a Ponzi scheme," as he indicated on his Twitter page on February 19 of 2010. Mr. Chiaro?

Mr. CHIARO. As I mentioned, Rio Tinto recognized in 1998 that climate change was a serious issue, that human emissions were a primary cause of it, and we think action needs to be taken soon to address it.

The CHAIRMAN. Mr. Leer.

Mr. LEER. I don't agree with Mr. Blankenship. We look at climate change as an evolving issue that's serious and needs to be addressed. We think how we address it and that technology is the most critical piece of that path forward.

The CHAIRMAN. Mr. Boyce.

Mr. BOYCE. Do not agree with Mr. Blankenship. Our view is the globe's climate has been changing since the globe was formed. Levels of CO_2 have risen in the atmosphere, and we have been a strong advocate for technology advances to reduce CO_2 in the atmosphere, particularly from the use of coal.

The CHAIRMAN. So the next question comes to you, Mr. Carey. I am a little bit confused, because we are being told by the natural gas industry that we did too much for coal in the Waxman-Markey bill and not enough for natural gas. And that is what natural gas executives are saying to us.

Do natural gas executives not understand how much more we helped them than you, since they are of the opinion that this $60 billion which we put in for carbon capture and sequestration and the other tools that we put in place in order to minimize the impact on coal consumers across our country are clearly being viewed by the natural gas industry as being much more friendly to the coal industry than to the natural gas industry? What don't they understand? You seem to think that there is a bias towards natural gas.

Mr. CAREY. Mr. Chairman, I was referring to the time tables but unfortunately I don't work for the natural gas industry. But I can tell you this. According to the studies that I have read with regards to what coal production would look like by 2030 under the proposals that have been initiated, we would look at a 77 percent decrease in the amount of coal. Now, for the 3,000 and some coal miners in Ohio, the folks in West Virginia, Kentucky, Western Pennsylvania, when you are eliminating 77 percent of those jobs, that is a concern. And when you look at the Appalachian communities and you look at what an average coal miner makes, in Ohio, it is roughly $65,000; I believe Congressman Salazar talked about Colorado being $65,000. Mr. Chairman, it is going to be devastating.

The CHAIRMAN. To the question on natural gas, sir, you are just dead wrong. Okay? We absolutely insured that we would deal with the coal industry in a transition and in such a way that actually drew criticism from the natural gas industry. So you are just wrong. And I just want to put that out there plain and simple. We did not approach this issue as anything other than one in which

we wanted to create a bridge for the coal industry to the future. Okay? And any other interpretation is just plain wrong. And the natural gas industry will testify to that, and over in the Senate, in fact, they are now lobbying in order to receive equivalent benefits to what the coal industry received.

Mr. Boyce—and I think this is important for us to clarify this issue. In your petition to the Environmental Protection Agency to overturn the scientific finding that greenhouse gases endanger public health and welfare, you state: "Peabody's petition is based primarily on the release of e-mail and other information from the University of East Anglia climate research unit in November of last year."

The British House of Commons has now reported that the hacked e-mails from the University of East Anglia climate research unit do not in any way cast doubt on the overwhelming scientific evidence of anthropogenic climate change. Do you now accept the broad understanding by scientists and governments that greenhouse gases threaten to destabilize global climate?

Mr. BOYCE. Our view and what we said in the petition was we think that EPA should take a step back and do more work internal to the U.S. To rely so heavily on an international body which did not have the ability for people here in the U.S. and scientists here in the U.S. to have the level of peer review, and with the number of issues that have come out relative to some of their basic data assumptions as well as interpretations. All we have asked is that the EPA step back and reconsider their endangerment finding.

The CHAIRMAN. So you continue to question then the scientific finding that greenhouse gases endanger public health and welfare?

Mr. BOYCE. As we look at the IPCC report and all of the issues that came out relative to its data and interpretations, we think there needs to be another independent review of that data. Whether those findings are sound or not, we think there needs to be another review to put to rest all of those issues.

The CHAIRMAN. Mr. Leer, do you question the scientific findings that greenhouse gases endanger public health and welfare?

Mr. LEER. I think that the EPA is a very, very—and using the Clean Air Act in their approach, the Clean Air Act is a very blunt instrument to try to address a very complex problem.

The CHAIRMAN. I am just going to the question. You earlier seemed to indicate, you and Mr. Boyce, along with Mr. Chiaro, all seemed to indicate that you acknowledged that climate change is occurring and that it is caused by CO_2 or other greenhouse gases. And now it seems as though you are backing away from it. So I am just trying to determine which is it. I am only going to the scientific question here of whether or not greenhouse gases do in fact cause global warming.

Mr. LEER. I think they are contributing to global warming, and that—again, I was trained as an engineer. I look at it, how do we address the problem? And I will let others, because I am certainly not a climate scientist and only know what I have read as well as others' comments, that whether the east Angola e-mails are an issue or not. They certainly, I think, raise questions in people's minds. But, more importantly, if we are going to address this problem, which I think we should, it is going to be driven by tech-

nologies of carbon capture. Otherwise, I don't think we can achieve the 2050 goals that are outlined in your bill or outlined in many other bills. And that is—I am the engineer approach.

The CHAIRMAN. We do agree with you on that. And that's why we put those tens of billions of dollars in the bill, so there would be a technological solution that we could partner on creating. Mr. Chiaro, do you agree that the scientific—with the scientific finding that greenhouse gases endanger public health and welfare?

Mr. CHIARO. We do think the science is strong. Yes.

The CHAIRMAN. Again, we thank you for that. We need to have—if we are going to create a public policy, we at least have to agree on this basic fundamental fact that the planet is warming and that greenhouse gases are contributing to that problem. And we still seem to have some disagreement here. And you, Mr. Boyce, are not, in fact, dealing with the issues scientifically in a way that divides the question from the means by which we would then deal with the issue. So we just need a clear statement here on that subject from you. And let me come back to you just this one final time on the science of global warming and on the relationship between greenhouse gases and the warming of the planet.

Mr. BOYCE. Well, as I said, Mr. Chairman, and the one known fact that we deal is that CO_2 has risen in the atmosphere over the last 100 years. And what we have always said is we want to use coal cleaner every day that we use it. We have almost a dozen clean energy projects that we are involved with in Australia and China and the U.S. You know, I think the scientific discussion, we leave to the scientists. What we say is we understand the public policy and the desire to have cleaner coal. We agree with that, and we are putting a lot of money and a lot of effort into trying to make that happen on a global basis.

Again, whether it is in Australia, tens of millions of dollars, whether it is our partnership in China in GreenGen or FutureGen here in the U.S., we have made investments in Calera, which is a new startup company to produce cement from CO_2 capture. We have money invested in GreatPoint Energy, which is trying to develop cleaner ways of gasifying coal.

So at the end of the day, it is our actions to try and promote and be a catalyst for clean coal technologies.

The CHAIRMAN. And we agree with you, Mr. Boyce; that is, that your investments in Calera, your investments in other companies show that you are working to solve the problem, but what we need you to say, because that will end this first stage of debate, is that there is a problem and that the science has identified a problem that has to be solved, and that your investments are related to that conclusion that there is a problem and that you accept it. Because then we can move on to working together to put together the solutions to solve the problem. So can we come back again to that scientific question?

Mr. BOYCE. Mr. Chairman, I think I have said, we agree CO_2 is rising in the atmosphere. That's an issue that needs to be addressed, and we are doing everything we can to try and promote technologies to address that issue.

The CHAIRMAN. Thank you, Mr. Boyce. I thank all of you. Let me now turn and recognize the gentlelady from West Virginia, Mrs. Capito.

Mrs. CAPITO. Thank you, Mr. Chairman.

I wanted to ask a question to Mr. Boyce and Mr. Leer that I alluded to in my opening statement. And I am curious to know in both of your companies what percent of your coal do you currently export? What are your largest exporting countries? Mr. Boyce. This is domestic coal that's mined here.

Mr. BOYCE. Today we are exporting very, very small quantities of coal in the export business. As you know, we no longer have any operations in the eastern part of the U.S. where most of the U.S. exports come from. We have a small amount of coal from Colorado and a very small amount of coal from the Midwest which we export to Europe. Other than that, all of our exports are from Australia to the Far East.

Mrs. CAPITO. So you are exporting your Australian product to China?

Mr. BOYCE. We export from Australia all over the world, China, India, Japan, Europe, Brazil.

Mrs. CAPITO. Mr. Leer.

Mr. LEER. Last year, even in the economic downturn, we did export a few boats out of Wyoming into the Pacific Rim. They ended up being in China, and I think India was a trader at the second boat. On the East Coast out of specifically mostly West Virginia, but also Kentucky and Virginia, we are exporting somewhere between 3 and 4 million tons of year in a normal year. Last year was down due to the economic recession. This year, just given the nature of particularly the metallurgical markets, we are seeing a significant rise in export opportunities; and I would guess that when the year is done, we will end up somewhere between the 4 to 6 million tons of exports.

Mrs. CAPITO. Thank you. The reason I am bringing that out and am curious about whether it is on the rise is because if we are going to put forth policies here in our own country to meet certain emission goals, would the industry then begin to look at other areas of the world who maybe aren't buying into emission goals to then push the product out across the rest of the world? And I have a hunch, I mean, you are in business to make money, that is probably what could happen. But I am going to shift to another topic. Technology. All of you talked about the need for technology. But there is an undercurrent here of, is it technology before emission targets, or emission targets before technology?

When do you reasonably think something that can be used full scale and go broad based in this country in terms of when CCS can actually be implemented in this country with success and achieving substantial targets? I know that is a ballpark.

Mr. LEER. It is a ballpark. And no one can really project the technology curb, other than history would tell you that once we get started it comes sooner and often we get significant advances.

In talking with our utility customers, who really are at the forefront of this, I think most of them talk somewhere in the mid 20s if we get started now. The key really is having the legal framework established and the funding, and certainly the Markey-Waxman

bill was a great start on that one issue. We had other concerns. But, again, I am an engineer. I look at, how do you solve the problem? You solve the problem by technology. Otherwise, we can't stabilize CO_2.

Mrs. CAPITO. There is a body of thought out there that believes this technology never will be able to achieve. I hear it certainly around a lot of skeptics that we are never going to be able to meet these targets. Do you have a response to that?

Mr. LEER. I do. And when you look at global CO_2 emissions, we had better hope that we can establish this technology, because that is what you want. No one has offered a path that allows energy growth and meets energy growth demands on a global scale other than the technology to capture carbon and store it. And it is a pretty simple answer. People may disagree that they don't like it, but that is the path to stabilize CO_2 in the atmosphere and no one else has offered a path to do it.

Mrs. CAPITO. Thank you.

The CHAIRMAN. Thank you. The chair recognizes the gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you. Mr. Carey, I found your comments that somehow Congress is waging a war on your industry pretty astounding. And the reason I say that, as I was thinking about your comments I ran into my grandchild, he is 15 months old, yesterday, on the sidewalk, got to mess around with him for a while. And I started thinking about what your industry is doing to his future. Because of the emissions from your industry, it is probable that there will be no healthy coral reefs in the world during my grandson's lifetime. It is probable that there will be no glaciers in Glacier National Park, which is a national treasure, in his lifetime.

It is probable that the acidification of the ocean will continue to an extent that, in some ways that we can't entirely predict will affect the food chain upon which the salmon depend, which my granddad and my dad and I and my wife fish for, that he won't be able to fish for. It is probable that there will be significant changes in the climate in the southwest so maybe he won't go and get to enjoy the southwest like I have in his lifetime.

If there is a war being waged here, it is a war on our grandkids, because the emissions from your industry are destroying significant parts of this one and only little planet we have got. Now, that is just a scientific fact.

Now, I don't think of it as a war, because the people in your industry are great people. They are hard-working folks, they are trying to make a living, they want to have a future in this industry. And I recognize that. So I don't use that term of war because I don't think they are waging war on our grandchildren. But I think your position is so irresponsible for your own industry that I have got to call it out.

We have put in a pool of $60 billion to your industry to be able to save it, save it in the sense that you will have a way to sequester carbon dioxide. And the smart folks on this panel recognize that the day will come that coal will not be a viable alternative if we do not find that technology. And we have given you $60 billion. We don't give $60 billion to al Qaeda. You want to see a war? We are in a war. We don't give them $60 billion. We don't give $60 billion

to industries we are at war with. We give $60 billion to people that we hope maybe there is a chance of saving, and that is what we are doing.

So let me just ask you. Will you personally, or your organization that you represent, tell us that you will replace that $60 billion that we have offered you in this bill?

Mr. CAREY. Chairman Markey, Congressman Inslee, it was a long question. There are many parts of it.

Mr. INSLEE. Listen, I don't want you to answer my comments. I want you to answer my question. Will you personally—and I think the answer is probably no—or your company or your organization tell the American public and the people you represent today that you will put up $60 billion to help save this industry by finding CCS technology to replace the money you are trying to take away by killing this legislation? Will you do that? And that is a pretty simple yes or no.

Mr. CAREY. I think the question, Mr. Chairman, Congressman Inslee, I think we have to examine parts of the question if we are talking about CCS technology. Now look, I am the chairman of the Ohio Coal Technical Advisory Committee. This is a body that actually works with clean coal projects, and we have been looking at for the last 10 years carbon sequestration and discussions on carbon sequestration. Nobody is arguing that is important.

Mr. INSLEE. I would really appreciate an answer. Are you personally, or your organization willing to commit today to spending $60 billion to try to perfect CCS technology to replace the money you lose if this legislation doesn't pass? Just give me a yes, sir, or no. I have got one more question I have got to ask Mr. Boyce.

Mr. CAREY. Mr. Chairman, Congressman Inslee, I would say that CCS is important. But if you are asking me to make a personal commitment that I will personally put $60 billion into carbon sequestration, that is not a very serious question.

Mr. INSLEE. How about your company?

Mr. CAREY. My association? My association represents small, medium-ranged companies that actually work on behalf of Ohio.

Mr. INSLEE. I will take your answer as no. If you want to amend it, go ahead.

Mr. Boyce, as I understand your position listening to your testimony, you seem to recognize the necessity, if not urgency, of developing CCS technology. But I seem to—if I can characterize your corporate philosophy, you have resisted in any way every way that I can ascertain any legal mechanism that would put a restriction on carbon dioxide emissions, which would—many of us would believe would drive investments into CCS technology. And what I hear you saying is that if we just trust the industry to make these investments, everything will be okay.

Folks at this table will put in billions of dollars. I don't know where you are going to get it, because you won't get it from us if we don't pass this bill. But you will put in billions of dollars. You will solve this problem. And then, after you solve this problem, then we can put a regulation on the industry of CO_2. Now, to me, that is a little bit like saying when they stop robbing banks, then we can put a law in effect saying you can't rob banks. And, frankly,

I have not seen a major environmental problem solved without some message to the industry to make these investments.

Now, is that a fair characterization, you are thinking on this? And I would ask you to comment on that thinking.

Mr. BOYCE. Thank you. No, I would have to say I don't believe it is a fair characterization. And the reason I say that is at the time of Waxman-Markey we indicated that there were some tremendous aspects to Waxman-Markey, great recognition of the role of coal, and, as you have both pointed out, strong funding for clean coal technologies and a mechanism to help provide some of that funding. But we had concerns that enabling the technology of CCS to go forward without having solved the legal and regulatory framework around the property rights, injection of CO_2, the long-term storage, as well as the aspect of hard caps until the technology and the time frame for that technology to be determined left us to where we didn't believe that we could support the bill in its current form. And I think that is all that we ever said. We have always—as I said earlier, we have been working with Senator Bingaman for a number of years in terms of the original proposals that he had laid out for improving our reductions in carbon and for a carbon management program.

It is just a matter of how all the components come together. We have concerns about the cost impacts. That is only natural. And we had concerns that capturing all the CO_2 without the ability to actually store it in the ground was a Catch-22 that we could not see our way around.

But I don't want anyone to believe that we don't feel that there needs to be carbon management programs going forward.

Mr. INSLEE. Thank you.

The CHAIRMAN. The gentleman's time has expired. And to the gentleman from Arizona, the gentleman from Washington State went over and we will note that as the gentleman is engaging in his questions.

Mr. SHADEGG. I will do my best to give back the time he took in going over.

I want to thank all the witnesses for your thoughtful testimony. I think these are complex issues that require thought and reflection.

I want to start, Mr. Boyce, with you. In questions propounded by the chairman, you indicated that with regard to the endangerment finding you believe that, given some of the doubt now cast on the science developed and relied upon by the IPCC and the University of Anglia, that you thought it was appropriate and your company felt it was appropriate for the EPA to take a step back and reassess that science. Is that a correct statement of your position?

Mr. BOYCE. I will tell you that, given that, whatever burden we put on society based on this issue, we have to have, or at least I think we should have public support for our position. I couldn't agree more that we should, in fact, step back and take a close look at that.

Mr. SHADEGG. The chairman cited the fact that the Parliament in England had found that there was nothing wrong with the science in its basic findings. I guess I am a little curious about

that. Do you know how many years the IPCC spent looking at science to reach its original conclusions?

Mr. BOYCE. The IPCC has been empanelled since 1992 or the early 1990s with the original Rio Treaty. So they have been looking at this data for a long period of time.

Mr. SHADEGG. So they have been looking at that data from 1992 to 2010, we will say roughly 18 years, and we now discover major flaws in it, some of which they admit including flaws about the Himalayan glaciers disappearing by 2035. They acknowledged those flaws. They spent 18 years reaching the conclusions; we now discover the flaws. How long have we known about the flaws in the science? It hasn't been 18 years. Has it?

Mr. BOYCE. No, sir. It has not.

Mr. SHADEGG. How long do you suppose it has been? Closer to 18 months?

Mr. BOYCE. Not even that. The fourth quarter of last year.

Mr. SHADEGG. Well, then I think your view that we should take some time and look at that science again, given it took 18 years to develop it and has now been cast in doubt, I don't think we can whitewash it in less than 18 months. So I think that is a considered position.

I also want to clarify a point you made earlier. I believe you said that you, in fact, support CCS and CCS technology and all clean coal technology. You simply want a regulatory atmosphere in which that can be carried out and everybody can understand and follow the rules. Is that correct?

Mr. BOYCE. That is correct. As I said earlier, we are involved in a number of clean coal technology projects across the globe, China, Australia, here in the United States. And we just firmly believe that we have to understand the time frame for deployment of the technology and the cost impacts to the economy of that technology deployment before we put the hard caps in place.

Mr. SHADEGG. Again, as I mentioned in my opening statement, I believe those costs will necessarily pass on to the consuming public and to businesses in America which must compete around the globe, and I think looking at those cost factors and looking at issues like, okay, so we can capture it. We have got that figured out. Where can we store it, and can we store it legally? And I haven't seen anybody jump forward and say, gosh, I want it stored under my land. And we seem to have had a parallel issue in Nevada where we tried to store nuclear waste, and some people in Nevada seemed to get upset. I think there is a United States Senator who is a little concerned about the storage of nuclear waste in that State. It seems to me storing carbon might be almost as complex as storing nuclear waste.

Can you elaborate for the committee—and this will be my last question—the specific elements of legislation we could pass that would allow for the utilization of coal that was, in fact, clean and in which the carbon had been removed? And we would resolve some of those issues so that we could in fact stop any of the uncertainty that I think is now impinging upon the development of coal and coal energy in the United States.

Mr. BOYCE. I think, as I indicate in my written comments and briefly alluded to in my verbal comments, we have laid out a path

for technology. I firmly believe that supercritical and ultra-supercritical power stations that are carbon capture ready as well as IGCC plants are carbon capture ready should be enabled to be built today. We know what the work, for instance, at AEA is doing, that we will have retrofit technology available for those plans. But, in the meantime, we have a serious need for additional energy, as does the rest of the world. And so that is the first step. And then these carbon demonstrations. FutureGen.

We have been a founding member of FutureGen and, like the committee, have been very frustrated that we have not been able to get that project up and running yet, although we continue to work extremely hard at trying to find the rest of the funding for that project. It is a full-scale plant. Inject CO_2 in the ground and store it.

Those are the types of things that need to be done. And then once that happens, then we can put in place the time frames and the regulatory framework to say this is the path and this is the ability of the U.S. economy and the global economy to absorb the cost of transforming our energy infrastructure.

Mr. SHADEGG. And you are willing to work with us on legislation to achieve those goals?

Mr. BOYCE. Absolutely.

Mr. SHADEGG. I yield back.

The CHAIRMAN. The gentleman's time has expired. The Chair recognizes the gentleman from Colorado, Mr. Salazar.

Mr. SALAZAR. Thank you, Mr. Chairman.

Mr. Boyce, Senators Rockefeller and Voinovich have proposed a phase-in technology plan for CCS that takes into account electricity production and industrial activities that produce CO_2, and proposes incentives for CO_2 development and deployment. Do you support that approach?

Mr. BOYCE. We support the premises in that bill. We are still looking at the specific language. But, basically, the concepts of enabling that technology, providing the framework for it, and then getting that technology right first, we absolutely support.

Mr. SALAZAR. Mr. Leer.

Mr. LEER. I would concur. I certainly have spoken with Senator Rockefeller on it, and again, we would like to review the details a bit more. But when you look at the premise, it, to us, is going in the right direction.

Mr. SALAZAR. Mr. Carey.

Mr. CAREY. Congressman, Senator Voinovich being from Ohio, we have worked very closely with him. And we are still continuing to review it, but we like the premise.

Mr. SALAZAR. Mr. Chiaro.

Mr. CHIARO. Yes. We certainly support the rapid deployment of CCS technology. That is why we are investing tens of millions of dollars in it ourselves to built a plant in California.

Mr. SALAZAR. Okay. Well, I appreciate your comments. We will start again with Mr. Boyce. How is uncertainty over carbon and climate change legislation in the U.S. Congress affecting the buildout of coal fueled generation systems?

Mr. BOYCE. Well, I think there is no question that we have got basically a stand-still in terms of new investments in the advanced

technology or current technologies for coal-fired power stations. We all know there has been a number of plants that have been put on the shelf or cancelled over the last year to 2 years because of the uncertainty around where are we going with carbon management in the future.

As I said in my statement, I think we ought to enable ultra-supercritical and supercritical power stations to move forward. They have got a footprint of anywhere from 15 to 40 percent lower carbon intensity of the existing fleet of plants that we have today. It is a fabulous first step. And then we add the carbon capture and storage technologies when they become available to those plants, which would be the preferred path.

Mr. SALAZAR. Mr. Leer.

Mr. LEER. I would concur with Mr. Boyce. And when you look at the uncertainty, I think—I try to put myself and maybe some of our utility customers' positions, and think, what would I be doing then? And there were very few good things that came out of the recession, but one of them probably was we had moved back our capacity needs 3 or 4 years. And given all of the uncertainties that surround this question and other questions, and even if you look at, say, natural gas renewables and where they might end up, my conclusion would be that I would stop building anything for a period of time and just sit there and wait for clarity to occur.

My concern with that is that we will let that—that will happen, and then 5, 6, 7 years from now, suddenly we will realize that the economy has started moving again, and hopefully in a dramatic fashion, and we will see reserve margins starting to diminish, and then we will be forced into taking panic positions and really on economic, I will call them, decisions because you just have to. And at the end of the day, American people do demand electricity, and they have every right to do that.

Mr. SALAZAR. Mr. Chiaro.

Mr. CHIARO. I think there is no question that the lack of a long-term carbon framework has a chilling effect on investment in coal-fired power generation. That is why we have been arguing for getting such a framework in place as soon as possible.

Mr. SALAZAR. Thank you. Mr. Carey, you mentioned that this legislation had provided only $10 billion for carbon sequestration, I think, in your testimony. The chairman and Mr. Inslee say that the legislation provides $60 billion. I just—I want clarification. Where do you get your numbers?

Mr. CAREY. Mr. Chairman, Congressman Salazar, I would be more happy to provide that.

The CHAIRMAN. If the gentleman would yield. There is $10 billion that is included as part of a wires charged that is included to support research and development and carbon capture and sequestration. In addition, the Waxman-Markey bill provides $50 billion additional for bonus allowances for carbon capture and sequestration installed in coal-fired plants before 2025.

So it is a grand total of approximately $60 billion for the coal industry for the research development and deployment of carbon capture and sequestration technology before 2025.

Mr. SALAZAR. So, Mr. Chairman, would that go specifically to research and development of CCS?

The CHAIRMAN. That is correct. And deployment. The $50 billion is for deployment of carbon capture and sequestration technologies in coal plants in our country before 2025.

Mr. SALAZAR. Thank you, sir, for that clarification. I yield back.

The CHAIRMAN. The chair recognizes the gentleman from Oklahoma, Mr. Sullivan.

Mr. SULLIVAN. Thank you, Mr. Chairman. First off, I got here late. I would like to extend to offer my condolences to the victims' families to the mining disaster last week in West Virginia, and I look forward to an investigation and learning what we can do to improve mining safety.

I have some questions for everyone. If the United States were to cap greenhouse gas emissions without similar commitments from the developing nations, how much would that lower total worldwide greenhouse gas emissions from burning coal. If no one else does it, is that significant?

Mr. BOYCE. Well, the reality is we know that China has become the largest emitter of CO_2, and that doesn't even include the rest of the world outside the U.S. So even with a cap here in the U.S., if nothing else was done particularly in the developing countries, the impacts would be negligible in terms of any impact and in terms of addressing rising levels of CO_2 in the atmosphere.

Mr. LEER. Again, we would concur with that conclusion. If you look at the developing world and the developed world, CO_2 admissions in Europe and the U.S. essentially have flattened. I mean, they are still growing slightly, but they have essentially flattened. The developing world is now emitting more CO_2 than the developed world.

So, again, we come back to really my fundamental engineering premise: If we are going to address this problem, it is carbon capture and sequestration, and we share it with the rest of the world through trade agreements, commercialization, whatever, however we get it there. But it is going to have to be cost effective from their perspective.

Mr. CAREY. Mr. Chairman, Congressman, there would not be a lessening, there would actually just be a displacing of the carbon dioxide emissions. And we simply look at what China and India, what they will do over the course of the next 20 years, the fact that their demand for coal, their demand for energy, the fact that they are bringing power plants on line. The only people that would be affected by this type of legislation would be the American people, the people that are paying the electric bills every day.

And point in fact, Administrator Lisa Jackson actually admitted this, I believe, in testimony before the EPW committee as did Secretary Chu. So both are very aware that this legislation would do little to curb overall worldwide CO_2 numbers.

Mr. CHIARO. I would agree, that if the U.S. is the only Nation that moves forward, the effect on total emissions to the atmosphere would be small, single digit percentages.

I guess the bigger concern for me, having attended the U.S.-China energy summit last October in Beijing is looking at what the Chinese are doing in all these alternative energy technologies. They are now leading the world in nuclear power plant construction, wind construction, solar construction, electric cars. They are

moving ahead very quickly on these clean energy technologies, much more rapidly than the U.S. And I fear that the jobs that will be lost will be in the new energy technologies.

Mr. SULLIVAN. So it would be extremely unwise for us to unilaterally enter into any kind of agreement without other developing nations being involved as well. And I agree with that.

Another question. What foreseeable impact will the EPA's endangerment finding and pending regulation have on the domestic coal industry? And how are you preparing for something like that?

Mr. BOYCE. Well, I think, as was mentioned earlier on the panel, you know, the Clean Air Act is a blunt instrument and it is our view that it was never really designed to handle something like CO_2. And if we are forced to go down an EPA regulatory path, the disruptions, not just to the coal industry but to every facet of American industry and our daily lives, is going to be significant as if EPA tries to regulate every emissions of CO_2 in the country, which eventually they will have to under the Clean Air Act. So that is a significant issue.

I would like to also add one point on CCS and why it is so critical. Post-2020, to meet the targets in Waxman-Markey, natural gas generating facilities will have to put CO_2 capture and sequestration technologies on them. And so this technology is critical not only for the coal industry, but for the gas, for fuel in general, and that is why we are so strongly in favor of it.

Mr. LEER. Again, I concur with Mr. Boyce. The EPA's approach on this I think will create unintended consequences that are unimaginable as it works through this economy. And we are focused very much on working with Congress to make sure that doesn't happen. I think Senator Rockefeller's proposal and Congressman Rahall's proposal to delay—step back and delay implementation 2 years is very sound as we really work through the system and work with Congress and all of industry to try to find a much better instrument to deal with the issue, as opposed to EPA handling it in a very blunt manner.

Mr. CAREY. Mr. Chairman, Congressman, we are actually in litigation right now on the endangerment finding. We have a lot of concerns with regards to the way the EPA came up with their data. Again, I mentioned it. They talk about the IPCC study 48 times, and actually in the supporting documents, company documents they reference it 395 times. So we have a lot of concern with that. But I also have to look at the fact that the idea that you only—you didn't have to find endangerment. You may. And you may make a ruling. It was completely up to the administration on this.

If you look at what Administrator Jackson actually said when she was in the EPW committee testifying on behalf of: If legislation such as the Kerry-Boxer bill were to have passed, would she still need to find this regulation. And she answered yes.

So we are very concerned with this. And we are concerned about what that would do to the jobs. Again, we are talking about the elimination of thousands of hard-working coal mining jobs in areas of this country that don't need to be hurt economically any more than they are. This is about families, this is about small grandchildren. This is about people that are trying to provide for their families, and we are very concerned.

Mr. CHIARO. We don't think the Clean Air Act and the endangerment finding is the best approach to address the climate change issue, which is why we are a member of the U.S. Climate Action Partnership and support the principles that are largely embodied in H.R. 2454.

The CHAIRMAN. The gentleman's time has expired. And, by the way, the chair will recognize himself for another round of questions. By the way, that is the point, the point that Mr. Chiaro is making. We are trying to create a legislative framework that is able to deal with the consequences of putting a cap on carbon. That is our goal in the legislation.

And, again, it continues to be a little bit of a mystery to me. In 2009, there were no new coal-fired plants ordered. There are 10,000 new megawatts of wind installed in the United States, 500 new megawatts of solar, 200 new megawatts of geothermal, 200 new megawatts of biomass electrical generation installed in America, 10,000 new megawatts of natural gas. Coal saw its percentage of total electrical generated capacity decline from 49 percent down to 44 percent in 2009. We have seen the rise in the price of coal anyway. It has gone up 60 percent over the last 5 years. Coal costs have gone up. That is without any price on carbon.

This legislation that we passed through the House of Representatives is intended on helping the coal industry. The legislation which Senator Rockefeller has introduced has $850 million a year for the next 10 years, our bill has $1 billion per year for the next 10 years to do research, to do development. But we add an additional $50 billion for the coal industry, which the Rockefeller legislation does not have. So we have a grand total of $60 billion; the Rockefeller legislation has a grand total of $10 billion.

So this disparity goes right to the heart of the question of whether or not we are, in fact, engaging here legislatively in an attempt to harm rather than help the industry.

We do believe there is an inexorable decline. We see it year after year in terms of the rise in the percentage of renewable electricity coming from natural gas, coming from wind, coming from solar, coming from actual installation of new energy efficiency technologies.

So I just think, Mr. Carey, that a lot of what you are engaged in here is really just crocodile tears that you are shedding for an industry that we are trying to help; because, otherwise, you are basically mirroring the whole path that the auto industry took in denial in terms of the technology revolution that was taking place around it, the desire to help the industry to make the transition, and then blaming those who were trying to help. Okay? And it is just a repetition of that over and over again.

And all I ask is that there not continue to be a misrepresentation, Mr. Carey, of what is, in fact, inside of the Waxman-Markey bill. And additional modifications that could be made as part of negotiations with the coal industry, with the utility industry, with natural gas and other industries as well. That goes right to the heart of this whole issue what we are doing. And my bottom line here is that we do believe that the coal miners of our country deserve a bridge to the future, and we are trying to provide that in

the legislation. Trying to hold on to something that is not tenable is ultimately going to come to harm those families.

That is our own belief, economically. And the reason—and we will go back to Mr. Chiaro's point. The reason that we do believe that we have to fund carbon capture and sequestration is that we have to solve it for the rest of the world. We have to develop a technology that can be used in China and in India. That is our responsibility as a Nation. We are a technological giant. We have the capacity to do this. The companies who are at this table are investing in carbon capture and sequestration technology. They are global companies, so they know that this is moving towards some—not only here but in other countries as well.

We are trying to provide the leadership and help the United States be first in its deployment. So that is really what this debate is all about. Okay? It is not whether or not we want to harm the coal industry. We don't. It is, can we make compatible the CO_2 that is emitted from the coal industry with new technologies in a way that creates a bridge to the future. If we don't, I think the pathway is inexorable, and that is down in terms of the amount of coal which is used in electricity generation in our country.

As State after State passes renewable electricity standards, there will be a higher and higher percentage of electricity generated from those alternative sources. We have all read the headlines in just the last couple of months with ExxonMobil purchasing a basically unheard of small natural gas company, which, along with six other natural gas companies, have discovered enough natural gas in our own country to increase natural gas reserves by 30 percent. And all of this has occurred just in the last 2 years. So this pathway is one where we want to partner with the coal industry to create this new technology in partnership you.

And, again, I keep coming back to this because we do not believe that this should be adversarial. We should try to partner in order to try to find a way to accomplish this goal to the mutual benefit of our country and the coal industry. Otherwise, I am very much afraid that there will be negative consequences for the coal industry because of the development of alternative technologies and other electricity generating sectors in our country.

And so I come back to use my 5 minutes to make that point and, again, to invite the industry to partner with us to solve the problem rather than continuing to engage in these kind of historical remain demand debates about whether or not the science is accurate or not. It is. But, rather, to really work as to how we can construct a technological pathway for the coal industry. If we do that, then it will be win-win.

The chair's time has expired again. Let me turn and recognize the gentlelady from West Virginia, Mrs. Capito.

Mrs. CAPITO. Thank you, Mr. Chairman. I am going to respond to some of your comments. I wasn't really going to say anything, but I want to do want to say we have the top two largest coal producing companies in our country. I did not hear——

The CHAIRMAN. Actually, the three top.

Mrs. CAPITO. Three. Excuse me. I did not hear a pushback or denial that CCS and increased technology and research is going to be a bridge to the future. I think they are fully engaged in this. They

realize this is the bridge to the future, and that this will continue to use our most abundant resource and keep people working. You mentioned that we have used less coal—so I think we have unanimous consent that this is the direction that we need to go.

You mentioned that less coal was used in 2009. We had a national recession. Many in my own district, we lost Century Aluminum out of our district, which was the largest energy consumer in our entire State, moved to, of all places, Iceland. But that is an enormous hit across this Nation in terms of why have we used less coal.

The other thing, you mentioned that no new coal plants or coal-fired plants have been developed. This begs a whole other issue, this whole permitting issue that we have been talking about. This is an area that is pervasive in this administration with the EPA and other regulatory agencies basically conducting an anti-coal agenda. And I think that is part of what we are seeing with the lack of permitting.

So I do think that we agree that CCS—I am really proud that the first experimental AEP plant is in the second largest coal-producing State in this country, in West Virginia.

The other thing that I think Mr. Chiaro has brought up sort of peripherally but is not the subject of this debate or this testimony is that the natural gas industry is going to have to also be at the forefront of this technology to be able to exist in the existing plants that we have right now.

And so I think, you know, that we realize in a State like West Virginia, whose State economy is heavily reliant on coal, that we need to begin to transition and transition into more advanced and more refined technologies to be able to use this. But at the same time, I have heard in the testimony, if we are going to ask for renewable standards—and that is great. But you are not calculating in we are going to have a larger demand for all kinds of energy. Why wouldn't we consider putting CCS or carbon sequestration as part of a renewable standard like they have in Pennsylvania? And I am not sure if it is in our West Virginia standard or it was put forth as a West Virginia standard. But these are the kind of questions that have come forth with me. And I think that acknowledging in your bill, while I didn't vote for it, that $60 billion—also, somebody says over here, well, you are saying you don't want $60 billion. Excuse me. The bill is over in the Senate. We haven't even passed this. It is not like anybody is turning their head down to $60 billion to try to invest in a technology that is going to keep people working, make sense economically.

So we are just looking for commonsense solutions. Let's look for a way to move forward. Maybe if we extend the deadlines out to where the technology can catch up to where we can meet admissions standards. These are the kinds of things that I keep hearing. I don't hear a denial that this is not a direction that we need to move as a Nation. Maybe where we are in disagreement is how quickly and in what kind of blunt instruments do we use to punish the middle part of our country or a State like West Virginia or the State in the middle where we are heavily reliant on fossil fuels to generate our energy. We want a commonsense energy plan that has

an all-of-the-above solution that is going to meet these standards and move us toward cleaner air.

So that is my comment. Thank you.

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

Mr. INSLEE. Thank you. We haven't talked about what we did in the stimulus bill, either, which was put $3.4 billion in to pursue carbon sequestration technology, including $20 million for a company called Ramgen, which is pursuing a compression technology which can make CCS more energy efficient by reducing compression costs. I just want to note that.

I wanted to ask, I will just ask Mr. Boyce, I guess. Let me ask Mr. Leer. I have already run out my quota with you, Mr. Boyce. I want to ask you about the economics of carbon emissions. Paul Krugman wrote a really interesting piece about the economics of carbon emissions, and I recommend it to anyone who is interested in the economics of this issue. Basically, what he was arguing is that coal competes with other sources of energy. It competes with wind energy, it competes with hydroelectric energy, it competes with solar energy.

Those three technologies don't put meaningful amounts of carbon dioxide. They do, in part, because you have to manufacture the stuff to make it. But certainly less than coal. And yet, so they are competing—you are competing with these other if I can just call them cleaner from a CO_2 aspect technologies. And yet, in the current state of the law, we allow one industry, the coal industry, to put gigatons of a pollutant, carbon dioxide, into our atmosphere which we all own jointly in unlimited amounts at zero cost, and that is using up the limited carrying capacity of our atmosphere. And I think any economist would look at that and say that is an externality. You are using up, you are costing society something, because you are using up our atmosphere's ability to absorb pollutants, but you are not paying anything for it and there is absolutely no limitation today whatsoever. You can put as many gigatons as you want without compensating the public for that loss at all, nor is it regulated.

Now, there is two ways to deal with that. One is to regulate the amount going in; or, two, to impose some costs associated with that. And I guess I would just ask you, from an economic fairness standpoint, and realizing there is all kinds of issues about how to do this. Mr. Boyce expressed some of the concerns about the existing bill. I guess, Mr. Leer, do you think it is fair for the coal industry to be able to impose this cost on the rest of the world and be able to put unlimited amounts of carbon dioxide in the atmosphere at zero cost from an economic standpoint? Do you think that is a good economic system?

Mr. LEER. Congressman, I appreciate what your question is, and there is always a large debate on externalities and what price they should be and the real cost. But I think it is reflective also in your not addressing in your question at least the other side of the equation, is that coal is the most competitive fuel source typically in most applications around the world other than hydro. And then you can get down into externalities there and the other questions. And that low cost gets passed on to consumers.

So can there be a price on carbon? Yes, there can be a price on carbon. And will that ultimately end up in consumers' cost of electricity, cost of products? Yes. That is the system ultimately that will be translated, or the business will go out of business. That can happen as well.

Today, when you look at all of our renewables, the way we are established in promoting renewables is to subsidize them heavily to try to make them more competitive with fossil fuels. And that is okay. That is what we are going to have to do with carbon capture and sequestration as well.

So in the premise, could there be a cost for carbon? Certainly. Will that cost ultimately end up in the price of electricity, in the price of all goods and services in the U.S. or elsewhere in the world? Yes.

Mr. INSLEE. So let me ask you, the experience we have had on trying to drive new technologies. When we needed a new technology to deal with sulfur dioxide, which scenario occurred? Scenario A, the industry on its own devices went out and made an investment to develop the technologies to deal with acid rain and develop the technologies to reduce sulfur dioxide emissions? Or, did scenario B take place, that the U.S. Congress imposed some cap, if you will, on the amount of sulfur dioxide going out, create a price associated with that pollution, and the industry then in response to that developed the technologies to solve that problem? Which occurred?

Mr. LEER. Well, as you are well aware, the Congress did within the Clean Air Act, both phase one and phase two, tighten SO_2 regulations. And ultimately the technologies advanced and were put into place.

The issue with SO_2 compared to carbon is SO_2 frankly was more regional in the U.S. CO_2 is global. And the point here, and also at the time, I think, if we go back—and we are going back to the very beginning of my career. There were alternatives. You know, utilities could do in an economic evaluation of moving to low sulfur coal. Scrubber technologies did exist. They got advanced further as a result of I think the legislation, but they were in existence. And we just find ourselves earlier in the technology curve at the moment.

Mr. INSLEE. If the chair would indulge me just one more question, if I may. Do you really think the industry would have solved the acid rain problem by itself in the absence of a regulatory requirement that they do so? Do you think they voluntarily would have made those investments, looking at it in retrospect.

Mr. LEER. One, I am in the coal industry, you are really asking a utility question. But I think the utilities would have started to address it. I think legislation advanced it further.

Mr. INSLEE. Thank you.

Mr. LEER. Or faster.

Mr. INSLEE. Thank you. I would point out we don't have a lot of time on this one, either.

Mr. LEER. That is why carbon capture and sequestration is so critical.

Mr. INSLEE. As is this bill. Thank you.

The CHAIRMAN. And while we have you here and you are the experts in the field, perhaps we can get brief comments from you on this: The U.S. Mine Safety and Health Administration cited the Upper Big Branch Mine with 1,324 safety violations from 2005 to 2010; in March of this year alone the mine cited 53 safety violations, including improper failure to ventilate the combustible gas methane. Is that a typical rate of violations for mines and can you give us your sense of what is needed in this mine safety area in order to make sure that we reduce the likelihood that other families won't suffer what is now being borne by those families in West Virginia?

Mr. Chiaro.

Mr. CHIARO. Well, I am a board member of Cloud Peak Energy, the former Rio Tinto division, and I am happy to say that we have the best safety record of the mining industry at Cloud Peak. And Rio Tinto generally has a very good safety record. We don't see the kind of level of violations that you are talking about at any of our mines.

To be fair, our mines are in the Powder River Basin, they are open cut mines, tend to have a different set of hazards associated with them than the underground mines in the East, and so I would expect there to be some difference. But I would have to say if I saw that level of violations at one of my mines I would be quite concerned.

The CHAIRMAN. Thank you. Mr. Carey.

Mr. CAREY. As I mentioned in my written testimony, Mr. Chairman, and also I believe in my oral, the importance of mine safety is very critical to Ohio. Anybody—I do want to give an anecdotal example just real quickly. I was driving in and there is a barn on my way to the airport from my house in Ohio, and on that barn it says, every day is Earth Day to a farmer. And I can assure you that every day is Mine Safety Awareness Day to every coal operator and every coal miner that goes into the ground every day.

The issues revolving around this tragedy, we do not know all of the answers yet, I don't know the level to what the seriousness, the size of the fines or the amount of fines or the size of the mine or any of that. It is not in Ohio, but I can assure you it will be addressed and we just have to keep those miners and their families in our prayers.

The CHAIRMAN. Mr. Leer.

Mr. LEER. You know safety and environmental compliance are core assets and values with us. When we look at violations we report them. Every week I get a report. If it is serious I get it instantaneously. If you look at operations like ours that operate large deep mines, large surface mines across the entire United States, we would argue with our peers, and it is a bit different than the profile that Preston talked about, was we really think we do lead the industry in overall safety performance, incident rates, lost time rates, and we set a standard that really our board doesn't even allow us to compare ourselves to the industry. We can only compare ourselves to ourselves. And last year was a record, the year before, beating the year before record. This year we are off to a record start. We will see how the year finishes. We take it very seriously, the number of violations that have been reported, and I

certainly haven't verified those myself, and I think you have to look at the severity of the violations because within the framework of the coal industry it is true that the big mines virtually every day are being inspected by a State or Federal inspector. And some violations are very, very serious and some are really almost a traffic ticket approach. And the key that I always preach to all of our employees is we take them all very seriously, but if there is a violation out there that has endangerment and really a major concern on safety, you better be on it before the inspector gets there, let alone when the inspector is there. And we will fix them immediately.

The CHAIRMAN. Thank you. Mr. Boyce.

Mr. BOYCE. You know we again feel like we are partners with both Steve and Preston in terms of trying to drive much better safety performance throughout our industry. 2009 was the safest year in our 126-year history, and over the last 3 years we have improved our safety performance over 40 percent. And we start every meeting within the company with a safety contact or a safety discussion, including our board meetings. So it is an issue that we deal with on a daily basis. Our safety vision is to be incident free at all of our operations, and we run 29 operations within the U.S. and Australia.

The issue of violations is one we treat every violation to look at and understand the underlying cause as to what occurred and why that violation was there and what we can do to rectify the situation.

We had, as an example of how seriously we take this, we had an operation in Illinois several years ago where we had a high level of violations. As we looked, brought in the safety professionals in the company to look at that, we determined we could not continue to mine that operation safely and we actually went through with the decision to shut that operation down. We were fortunate to be able to move all of our employees to another operation in the area, but we had to then take the financial impact with the customers to make that decision. It is just something that you have to do. We have an obligation and we have a view. I joined the industry in 1977, the passage of the initial Safety Act. And when I joined the industry accidents were statistics; what we have tried to drive in the industry is every employee deserves the right to go home safe every day and we are not going to be happy until that happens. And we look at those citations and at our safety statistics very, very carefully, every day.

The CHAIRMAN. Thank you, Mr. Boyce, very much. We thank our panelists for their participation here today. This issue of coal is right at the heart of the question of whether or not we are going to control dangerous greenhouse gases while at the same time enhancing our national security and creating jobs here in the United States. That is our goal. And what I would basically recommend to the industry is that they do engage in the Senate in their efforts right now to find a bridge to the future for the coal industry. We believe that Waxman-Markey is that bridge, but we also do not believe that it is in any way not capable of being improved. And so we would urge you to work towards that goal. There is an inevitability to there being a price placed on carbon, it is going to hap-

pen. And so I think the better course, one not adopted by the auto industry, would be to try to start out where you are going to be forced to wind up anyway because ultimately there are partnerships here, constructive partnerships, that be want to basically put together with the industry in order to achieve those goals.

Mr. Boyce said earlier we should leave the science to the scientists, and we have a letter from 18 scientific groups, scientific organizations saying observations throughout the world make it clear that climate change is occurring and rigorous scientific research demonstrates that the greenhouse gases emitted by human activities are the primary driver.

So that is the world and we should not be in denial, but rather we should be engaging this. We do believe that we can do so in a way that preserves coal mining jobs in our country. I am working with you in partnership to make coal mining a safer industry. We can do so for one that for the rest of the century continues to have coal as a central part of our industrial sector.

We thank you for your participation. We want to work with you closely in these months ahead. And with that, this hearing is adjourned.

[Whereupon, at 11:48 a.m., the committee was adjourned.]

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

Mr. Boyce:

Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 3 weeks. Responses may be submitted in electronic form, at jonah.steinbuck@mail.house.gov. Please call with any questions or concerns.

Sarah Butler
Chief Clerk
Select Committee on Energy Independence and Global Warming
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Responses to the Select Committee on Energy Independence and Global Warming
Submitted on behalf of:

Gregory H. Boyce
Chairman and Chief Executive Officer
Peabody Energy

1. **Do you believe China will adopt mandatory restrictions on greenhouse gas emissions?**

   I wouldn't attempt to predict whether or not China will adopt mandatory greenhouse guidelines, but China's ability to opt out of a carbon cap regime, like other developing nations, is precisely the reason why we must push for global technology solutions as the appropriate path toward carbon management.

   Since 1980, Chinese GDP has soared 3,400 percent. I call that an "economic miracle" that is powered by coal, which increased 316 percent during that time. China also has stated its desire to improve its carbon intensity as a percent of GDP and is developing clean coal technologies. These include projects that advance carbon capture and storage (CCS) such as the GreenGen power plant and carbon research center near Tianjin. Peabody is the only non-Chinese equity partner in the project, which will begin phase 1 generation as early as 2011.

2. **If the United States were to move away from using coal, do you believe that would lead to changes in the coal consumption habits of the developing world, specifically China and India?**

   Both China and India are forecast to continue increasing their coal use, and leaders of both nations continue to confirm energy policy that supports this long-term view. China's annual coal use is set to grow 2 billion tons in the next two decades alone. India is forecast to become the second largest coal consumer behind China during the same period.

   I would also reinforce that every United Nations Millennium goal starts with access to modern electricity as a necessary prerequisite. Yet there are still 3.6 billion people around the world – more than half the world's population – who lack adequate access to electricity.

   The world will need the equivalent power of five times existing U.S. generating capacity by 2030 as billions of people gain greater access to electricity around the world. About 90 percent of projected coal demand growth in the next 20 years is expected to come from Asia.

   Coal will continue to be the primary global generation source, and coal use is expected to grow faster than all other fuels combined in coming decades. Broad deployment of carbon capture and storage technologies will enable us to achieve carbon reduction goals as we empower people and economies with coal-fueled electricity, which is essential for lifting people out of poverty.

3. **If the United States were to cap GHG emissions without similar commitments from developing countries, how much would this lower total worldwide GHG emissions from burning coal?**

   If the United States caps emissions and there are no similar commitments from developing nations, it is likely that total global greenhouse gas emissions would be largely unchanged as economic development simply transfers to other nations. Neither the United States or the developing world can realistically set an artificial cap on greenhouse gas emissions without affordable, deployable low-carbon coal technology. Coal fuels about half of U.S. electricity and is a necessity for any society to prosper and improve quality of life.

   Technology provides the path to meet our energy, economic and environmental goals. We must continue to advance a business and regulatory framework that enables rapid commercial deployment of near-zero emissions technologies with CCS.

Peabody supports continuous reduction in carbon emissions toward the goal of near-zero emissions from coal. America has always been successful in emissions reductions with this approach, which has resulted in dramatic environmental improvement: As coal use and gross domestic product have tripled in the United States since 1970, regulated emissions have been reduced 84 percent per megawatt hour. Technology will enable us to achieve similar success with CCS.

4. **What foreseeable impacts will EPA's endangerment finding and pending regulation have on the domestic coal industry?**

The effects on any particular industry are difficult to assess given that the extensive nature of the rules are still being developed. But it is clear that this finding would have broad economic impacts as carbon dioxide is a result of nearly every business activity in America.

EPA regulation under the Clean Air Act is not a cost-effective way of reducing carbon emissions and would do more harm to families and economies than good. Peabody believes that the best way to reduce carbon emissions globally is to incentivize broad deployment of clean coal technologies.

Like many other states, legislators and business leaders, Peabody believes that the EPA should reconsider its claim that what the EPA calls greenhouse gases may endanger human health. This is particularly true given questions regarding the quality of science contained in the International Panel on Climate Change report, which was the scientific basis for the EPA's endangerment finding. The EPA also did not take into account the tremendous benefits of affordable electricity to society.

The agency needs to step back and begin a thorough review of the real state of science surrounding what the agency refers to as climate change and include in its review the enormous benefits delivered by coal-fueled electricity. Peabody supports continual emissions reductions toward the ultimate goal of near-zero emissions from coal. That path is technology first... deployment requirements second.

5. **If Congress were to pass a cap and tax scheme, do you believe all other federal laws, state laws, and EPA regulations should be pre-empted? Please explain why or why not.**

Any Congressional law addressing carbon reductions should pre-empt all other federal and state laws and regulations, including, for example, the Clean Air Act, the Clean Water Act, the Endangered Species Act and other federal authorities, state and regional cap-and-trade programs, and state and federal common law tort laws.

To the extent that there is federal legislation around carbon management, it must prevent multiple programs establishing multiple requirements, many of which may be conflicting and inconsistent.

Answers to Submitted Questions by Mr. Steven F. Leer

Do you believe China will adopt mandatory restrictions on greenhouse gas emissions?

While we have no special insights into Chinese energy policies, we do monitor closely energy-related developments around the world. It is our belief that China's top priority in the energy arena is building a robust energy infrastructure – fueled primarily by coal for power generation as well as for the production of transportation fuels and chemical feed stocks – that can support its fast-growing economy, lift the living standards of its people, and improve its energy security. While China is also seeking to improve its environmental standards, the government appears to be focused primarily on those pollutants with direct and measured impacts on human health, such as sulfur dioxide, nitrous oxides and particulates. We view this as unsurprising, and would note that the developed world followed a similar path in first addressing these same pollutants before turning its attention to greenhouse gases.

While air quality is still very poor in many Chinese cities, the government now requires new coal plants to be fitted with modern emissions control devices that can address these more traditional pollutants. The government also appears to be taking steps to ensure that these emissions control devices are operated consistently and effectively – while at the same time imposing standards that are pushing power generators to seek out lower sulfur coals from other parts of China or via imports. While these actions will contribute to improved air quality over time, China still has a long way to go in improving urban air quality. Until air quality improves markedly – and China's economic growth slows – we believe it is unlikely China will take action to curtail its total carbon dioxide emissions in a meaningful way. Given China's expected growth, greenhouse gas emissions will likely continue to grow as well.

If the United States were to move away from using coal, do you believe that would lead to changes in the coal consumption habits of the developing world, specifically China and India?

We believe that China and India will continue to build their economies on coal-based energy – which is abundant, reliable, secure and affordable – regardless of policy developments in the rest of the world. Both countries are in the midst of ambitious programs to boost coal-based power generation significantly and to expand the use of coal through conversion of coal to transportation fuels Ten years ago, Chinese coal consumption was comparable to that of the United States, at just over 1 billion tons per year. Today, China consumes more than 3 billion tons per year, or roughly three times total U.S. coal consumption. We expect that rapid growth trend to continue indefinitely in both China and India, through both production of indigenous coal resources and increasing imports of coal from other nations. The rest of the developing world is almost certain to follow the same pattern.

If the United States were to cap GHG emissions without similar commitments from developing countries, how much would this lower worldwide GHG emissions from burning coal?

Carbon dioxide emissions from non-OECD countries now exceed emissions from the developed world. Moreover, emissions from non-OECD countries are expected to increase by at least 50% – and perhaps much more – in the next 20 years. Some energy analysts believe that acting aggressively to restrict carbon emissions in the developed world – without a comparable effort in non-OECD countries – will simply act to spur the migration of manufacturing and other energy-intensive economic activities to the developing world, with no benefit to the climate system. We share that view. Clearly, efforts to address the climate challenge must be global in nature and include the rapid development and deployment of carbon capture, utilization and storage technologies in order to succeed.

What foreseeable impacts will EPA's endangerment finding and pending regulations have on the domestic coal industry?

Coal is America's greatest energy resource. The use of coal enhances America's energy security, boosts the competitiveness of American businesses in the global marketplace, and contributes to a higher standard of living for all Americans. Unfortunately, the Environmental Protection Agency is prohibited from taking any of these important benefits into consideration when formulating environmental regulations. Consequently, we believe it would be a very serious mistake for Congress to allow EPA to regulate GHG emissions in the absence of federal climate legislation. Should Congress fail to block such an effort, the consequences for the U.S. economy broadly – and the U.S. coal industry specifically – are likely to be dire.

If Congress were to pass a cap and tax scheme, do you believe all other federal laws, state laws, and EPA regulations should be pre-empted? Please explain why or why not.

We believe that regulatory certainty is an absolute imperative in maintaining a reliable, secure and affordable power generation system in the United States. In recent years, U.S. power generators have struggled to contend with a Gordian knot of competing and overlapping regulations. These competing regulations have created an uncertain investment climate and have too often dissuaded power generators from making necessary investments in power generation infrastructure. As a result, the U.S. power grid – which historically has provided U.S. companies with a significant competitive advantage and contributed to a higher standard of living for all Americans – is showing signs of age and diminished reliability. In fact, prior to the economic downturn, many analysts had warned that reserve margins were growing dangerously thin in many parts of the country. While the recession has alleviated some of the very near-term capacity pressures on the power generation system, we fully expect serious pressures to re-emerge as economic growth resumes. Without the pre-emption of other federal and state laws and EPA regulations, a carbon management system is certain to impose even greater paralysis and under-investment – and create a serious, deep and structural threat to America's future energy supply. An additional area that merits preemption is the

emerging trend of class action lawsuits against energy producers and converters alleging damage caused or contributed to by greenhouse gas emissions

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

April 29, 2010

Mr. Hopkins:

Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 3 weeks. Responses may be submitted in electronic form, at jonah.steinbuck@mail.house.gov. Please call with any questions or concerns.

Sarah Butler
Chief Clerk
Select Committee on Energy Independence and Global Warming
(202)225-4012
sarah.butler@mail.house.gov

1.) **Do you believe China will adopt mandatory restrictions on greenhouse gas emissions?**

Although it is hard to evaluate what this means because the future rate of growth of their economy is unknown, China undertook mandatory restrictions in the Copenhagen climate talks of 40 to 45 percent relative to GDP. It is somewhat difficult to tell what this means because the future growth rate of their economy is of course uncertain. Their willingness to consider undertaking this commitment is significant, but even more important is their massive level of investment in all forms of energy, especially low-carbon energy. China is currently deploying renewable and other low carbon, highly efficient energy sources (advanced coal plants, coal gasification, nuclear) at a faster rate than the US, allowing them to lower costs, perfect their technologies, and assume leadership in critical global industries.

2.) **If the United States were to move away from using coal, do you believe that would lead to changes in the coal consumption habits of the developing world, specifically China and India?**

Coal is used in the US and elsewhere because it is indigenous, affordable, abundant, and because coal's non-GHG-related emissions have known and effective

controls. Our preferred solution is not to move US energy demand away from coal but rather to make coal a low-carbon energy source. We think that if the US and other developed countries were to deploy low-carbon coal technologies they would be widely adopted by developing countries, including in India and China, as part of their commitment to address GHG emissions.

3.) **If the United States were to cap GHG emissions without similar commitments from developing countries, how much would this lower total worldwide GHG emission from burning coal?**

Climate change represents a pollutant stock problem rather than a pollutant flow problem. In other words, it is the cumulative emissions of GHG emissions that matters. In this regard, the US has already emitted more GHGs than any other nation, and remains the second largest annual emitter even today. If one ignores past contributions to the stock of GHGs in the atmosphere already, the question on how much US action affects global coal emissions is straightforward. EIA analysis of HR 2454 indicates that under business as usual, emissions from burning coal would total 44 billion tons of CO2 over 2012-2030. In contrast, under HR 2454's 'Basic' scenario, emissions from coal would be 32.1 billion tons over the same period. This analysis shows 68 gigawatts of carbon capture and storage (CCS) capacity in place by 2030 under HR 2454, much of it brought online in the final five years of the period modeled.

We expect that if this level of deployment, or anywhere near this level of deployment, were achieved in the US as a result of the provisions and incentives in HR 2454, it would help to substantially decrease the costs of operating a coal plant using CCS. Successful domestic deployment of CCS puts the US in a favorable position to export the technology to others. As the technology is successfully deployed elsewhere, it can help to substantially lower total worldwide emissions from burning coal.

An additional and very interesting consideration, not reflected in the question, is how much global concentrations of GHGs are impacted by US actions alone. EPA analysis of HR 2454 (http://www.epa.gov/climatechange/economics/pdfs/HR2454_SupplementalAnalysis.

pdf, especially slide 15) is useful here, showing that impacts in 2100 are significant compared to either (1) a global business as usual GHG concentration of 931 ppm in 2100 or (2) an internationally coordinated strategy GHG concentration of 457 ppm. In the former case, Analysis of HR 2454 from EPA suggests that US actions have the potential to drive global GHG concentrations 64 ppm lower through 2100 (867 ppm versus 931 ppm CO2e). In the latter case, where the US fails to act and the rest of the world acts in a coordinated way it would drive GHG concentrations 46 ppm higher (503 ppm without US action versus 457 ppm CO2e with US action).

4.) **What foreseeable impacts will EPA's endangerment finding and pending regulation have on the domestic coal industry?**

As a coal producer, we like to see healthy demand for our product. One of the strongest signs of healthy demand is investment in new coal plants. We answer the question in terms of what the endangerment finding and its associated regulation does to demand for coal and investment in new coal plants. For years, demand for coal to power existing plants has been relatively steady, while investment in new coal facilities has been exceedingly low compared to investments in natural gas and renewables generation. While total coal capacity has not grown over time, the large installed generation base has served to protect existing coal volumes from erosion. The low investment levels in new coal technologies result from investor uncertainty regarding the nature and scope of climate rules going forward in time, and coal's opponents' success in blocking construction and operating permits for new plants.

The regulation of GHGs under existing Clean Air Act authorities may change this dynamic substantially. Investment in new coal capacity may or may not recover after EPA defines Best Available Control Technology (BACT) for coal. Additionally, existing plants could face an increasing risk of being mothballed, depending on whether New Source Performance Standards are enacted that impact their operations.

One of the key uncertainties regarding EPA regulation of GHGs under the CAA is that CAA regulation cannot provide the strong support for CCS technologies which could be provided by comprehensive cap-and-trade legislation. We believe cap-and-trade legislation with incentives to demonstrate and deploy coal with CCS provide a

higher level of investment certainty and a better opportunity for coal to compete for future market share.

5.) **If Congress were to pass a cap and tax scheme, do you believe all other federal laws, state laws, and EPA regulations should be pre-empted? Please explain why or why not.**

Congressional action on climate change should remove overlapping and redundant regulations on GHGs. For example, a federal market-based system should supplant state and regional GHG regulations, and likewise existing Clean Air Act authorities would largely become redundant under an economy-wide market-based system such as that proposed by the US Climate Action Partnership's *Blueprint for Legislative Action*. Congress should consider the use of complementary measures, in addition to establishing a carbon market, that create incentives to accelerate the transition of and to ensure reductions within the power sector, but these should be temporary. Our recommendation is to maximize compatibility and avoid conflicts between local, state, and federal programs which could unnecessarily drive up compliance costs and make achieving our nation's environmental goals more difficult and costly.