



June 18, 2014

CLIMATE CHANGE: THE NEED TO ACT NOW

U.S. SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED AND THIRTEENTH CONGRESS, SECOND SESSION

HEARING CONTENTS:

WEBCAST: [Duration: 2:44:23] [\[view complete hearing with Adobe Flash Player\]](#)

WITNESS STATEMENTS:

Hon. William D. Ruckelshaus [\[view pdf\]](#)

Strategic Advisor, Madrona Venture Group, and Former Administrator, U.S. Environmental Protection Agency

Hon. Christine Todd Whitman [\[view pdf\]](#)

President, The Whitman Strategy Group, Former Governor, State of New Jersey, and Former Administrator, U.S. Environmental Protection Agency

Hon. William K. Reilly [\[view pdf\]](#)

Senior Advisor, TPG Capital, Chairman Emeritus, ClimateWorks Foundation, and Former Administrator, U.S. Environmental Protection Agency

Hon. Lee M. Thomas [\[view pdf\]](#)

Former Administrator
U.S. Environmental Protection Agency

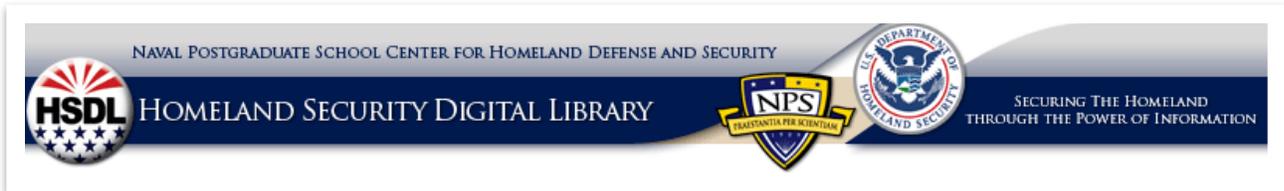
Dr. Daniel Botkin [\[view pdf\]](#)

Professor Emeritus of Biology
University of California, Santa Barbara

Hon. Luther Strange [\[view pdf\]](#)

Attorney General
State of Alabama

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Naval Postgraduate School, Center for Homeland Defense and Security.*



Dr. Joseph R. Mason [\[view pdf\]](#)

Hermann Moyse, Jr./Louisiana Bankers Association Endowed Professor of Banking
Louisiana State University, and Senior Fellow, The Wharton School

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Testimony of William D. Ruckelshaus
Before the Clean Air and Nuclear Safety Subcommittee
U.S. Senate Committee on Environment and Public Works
June 18th, 2014

Thank you Senators Whitehouse, Sessions and other members of the Subcommittee for convening this hearing on a matter of enormous consequence for our future.

Several months ago, after talking with one another, the four former EPA administrators sitting in front of you found we were convinced by the overwhelming verdict of scientists that the earth was warming and that we humans were the only controllable contributor to this phenomenon. Given those facts we all signed an op ed piece that recommended that America get serious about reducing our contribution to changing the world's climate rather than simply sitting back and accepting the avoidable consequences.

If anything, new reports in the last three months have made the need to act even more urgent. It is hard to believe that there is any question of that.

- The IPCC report validates in the strongest terms the science of climate change and the projected impacts.
- The National Climate Assessment documents impacts occurring here in this country right now.
- And a report from the CNA Corporation highlights the national security and military readiness concerns due to climate change.

We have, as EPA administrators, served four Presidents over four decades. We have successfully wrestled with a variety of public health and environmental problems, all contentious, including severe automobile and industrial air pollution, widespread water pollution and the unacceptable effects of pesticides like DDT.

We have made progress. We have cut automobile emissions, for example, by 95% and greatly improved air quality while the number of cars has doubled. The hole in the ozone layer and acid rain are under control.

Inherent in all of these problems was uncertain science and powerful economic interests resisting controls. The same is true of climate change. In all of the cases cited the solutions to the problems did not result in the predicted economic and social calamity. Scientific uncertainty or the inevitable industry resistance does not mean that nothing should be done unless we are willing to suffer the consequences of inaction.

We believe there is legitimate scientific debate over the pace and effects of climate change but no legitimate debate over the fact of the earth's warming or over man's contribution. The models of the world's leading scientists predict rising seas, drought, floods, wildfires, and more severe and frequent storms. We are seeing impacts already. Since the ocean absorbs 25-30% of the carbon from stationary or mobile sources we thought the ocean was our friend. It was keeping significant amounts of carbon from the atmosphere. But our friend is paying a penalty. The carbon from the burning of fossil fuels is causing the acidity of the ocean to rise and is already threatening shellfish, coral reefs and other ocean species. The culprit is the same carbon that originated from fossil fuels that is contributing to planetary warming.

We also know that if America does not get serious about our responsibility to deal with this problem nothing much will happen in the rest of the world. Not taking action is a choice. It is a choice that means

we leave to chance the kind of future we want, and opt out of the solution to a problem that we are a big part of.

We like to speak of American exceptionalism. If we want to be truly exceptional then we should begin the difficult task of leading the world away from the unacceptable effects of our increasing appetites for fossil fuels before it is too late.

This is an extremely complex problem whose solutions are not straightforward. We believe this is no excuse for complacency or not stepping up to our responsibility.

**Statement of the Honorable Christine Todd Whitman
before the
United States Senate Committee on Environment and Public Works
Subcommittee on Clean Air and Nuclear Safety
Washington, D.C.**

June 18, 2014

Thank you, Mr. Chairman (Whitehouse) and Ranking Member Sessions for the opportunity to appear before you this morning. It has been some time since I have appeared before a Senate committee. It's good to be with you.

I must begin by expressing my frustration that the discussion about whether the Environmental Protection Agency has the legal authority to regulate carbon emissions is still taking place in some quarters.

The issue has been settled. EPA does have the authority. The law says so and the Supreme Court has said so twice. The matter should be put to rest.

Given that fact, the Agency has decided – properly, in my view – that it should act now to reduce carbon emissions to improve the quality of our air, protect the health of our people, and as part of an international effort to address global climate change.

For the United States, climate change is not just an environmental issue or an economic issue. Climate change also has very real implications for our national security, and those concerns must be an important part of the discussion.

We all know, after all, that the earth's climate is changing. We also know that human activity, although not solely responsible, as we should freely acknowledge, is both contributing to that change and increasing the risk that we will push the environment beyond the point at which we can repair it. And we should know that when one is contributing to a problem one has an obligation to contribute to its solution. That's what the EPA is trying to do.

There is, of course, honest disagreement about aspects of the Agency's power plant proposal, including whether it may be stretching its legal authority a bit too far in some parts of the proposed rule. I'm sure, however, that EPA will be made aware of any and all concerns during the comment period. But I hope the primary focus will be on the substance of the proposed rule, and not EPA's broad authority to promulgate it.

That being said, it's clear that the Clean Air Act, as it now stands, is an imperfect tool to address the unique challenges that climate change presents. Congressional action and leadership would be a preferable approach. But since Congress has declined to act, the EPA must.

Action will not come without cost. But since President Nixon created the EPA in 1970, it has sought to carry out its mandate in a balanced way. Environmental protection and economic prosperity are not mutually exclusive goals.

EPA has not always been able to reach a state of perfect equilibrium. It has, however, consistently struck a reasonable balance that protects both the health of the environment and the health of our economy.

To illustrate, from 1980 to 2012, the total emissions in the United States of six common air pollutants dropped by 67 percent. At the same time, our population grew by 38 percent, our energy consumption increased by 27 percent, and our GDP more than doubled, in constant dollars.

So more people, consuming more energy, emitted much less pollution without sacrificing economic growth. That is clear evidence of the balance the EPA has struck.

If the past is prologue, further reductions are achievable and affordable.

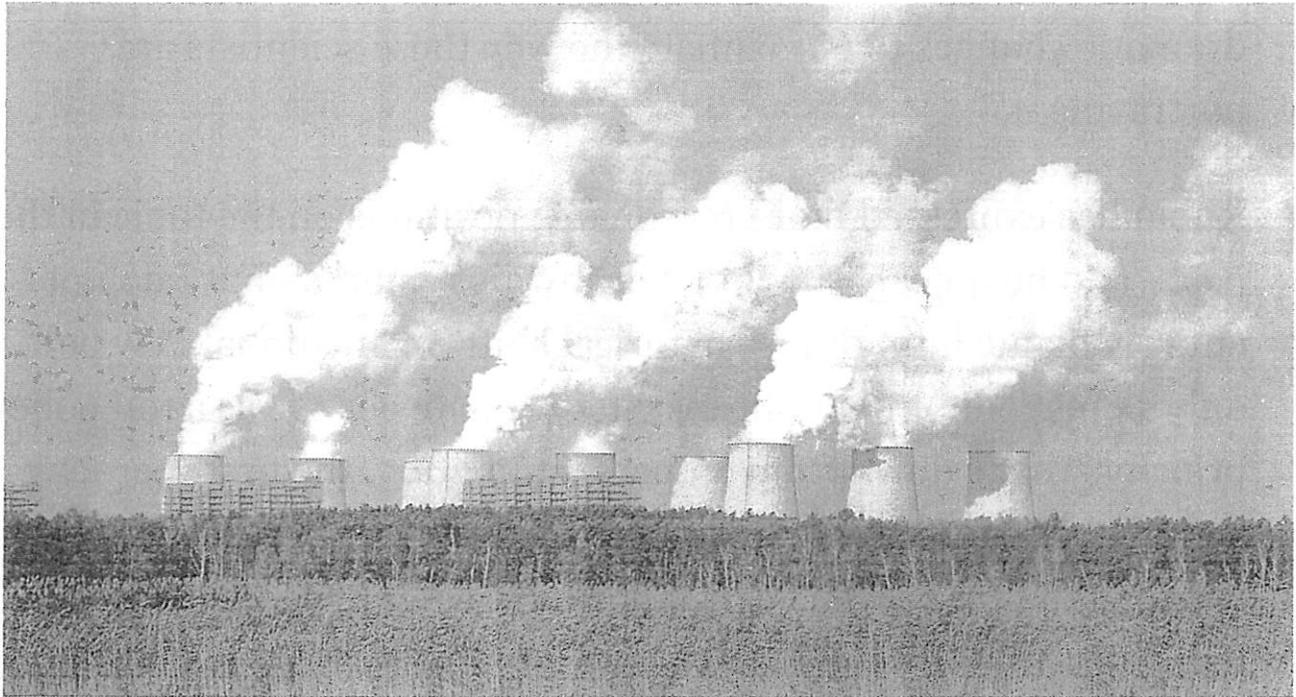
Mr. Chairman, my hope is that Congress will, at long last, acknowledge that climate change is real, that humans are contributing to it, and that the potential consequences of inaction are far greater than the projected costs of action.

We have a scientific consensus around this issue. We also need a political consensus.

The two parties were able to rally around a common purpose in the early days of modern environmental policymaking. It is urgent that they do so again.

Thank you.

POLITICOMAGAZINE



IN THE ARENA

The Climate Is Changing. Republicans Need to Open Their Eyes Before It's Too Late.

By CHRISTINE TODD WHITMAN | May 14, 2014

This week, two teams of scientists announced that the West Antarctic ice sheet has begun collapsing, beginning what they call an “unstoppable” process that could raise sea levels by as much as 15 feet over time. “This is really happening,” Thomas P. Wagner, one of the researchers, told the *New York Times*. “There’s nothing to stop it now.”

The timing was especially unfortunate for Marco Rubio, the Florida Republican senator and 2016 hopeful, who had just cast doubt on

the phenomenon of human-induced climate change, telling ABC News, “I do not believe that human activity is causing these dramatic changes to our climate the way these scientists are portraying it.”

Rubio has expressed more reasonable positions on the topic in the past—and he quickly sought to clarify his remarks—but I do not entirely blame him for his rhetorical shift. In an annual Pew poll, only 14 percent of Republicans cited climate change as a top policy priority. That’s down from 23 percent in 2007, the first year Pew included climate change in its priority list. The party has clearly changed in those seven years, and Rubio knows where his voting base for 2016 is on the issue.

This is not simply a problem in the Republican Party, though. The American public routinely ranks addressing climate change low on its list of priorities for Washington. This year it ranked 19th among 20 issues tested by Pew, just behind “dealing with moral breakdown” and “improving roads, bridges, public transit.”

The climate issue is politically challenging not only because it’s at the bottom of people’s priority lists, but also because of overreach on both sides of the debate. Humans aren’t the sole “cause” of climate change, and environmentalists have done a disservice in making that claim too assertively. Our activities are exacerbating natural phenomena, making us part of the problem, but the Earth and its climate has been changing since it was formed. Because of human activity, things *are* changing faster than nature or humans can

adapt, and the sooner we start taking steps to slow things, the better off we will be.

The modern environmental movement arguably began with Teddy Roosevelt, the Republican president who established the national park system. A Republican president, Richard Nixon, and a Democratic Congress created much of our landmark environmental legislation, including the Clean Air Act and the establishment of the Environmental Protection Agency. But Republicans have gotten away from those values in recent years. The only way to return the GOP to its roots and, in turn, make headway on climate change is by ensuring that Republicans—and all Americans—recognize the very real economic costs of not protecting our environment.

Scientists have long predicted that one of the consequences of climate change will be more frequent and more severe storms. They can't predict where and when they will occur, but the extreme magnitude of them reflects climate change. We saw the destruction wrought by Hurricane Sandy in 2012, and I do not want anyone to have to endure what citizens of the New Jersey and New York coastlines experienced in that storm. Taking just my home state as an example, New Jersey's 127 miles of sandy beaches contribute approximately \$20 billion in economic activity to New Jersey's economy. More frequent and more severe storms means more homes and businesses destroyed, state economies blighted and of course, most importantly, more lives lost. We simply cannot afford to let that happen.

And the climate's not the only thing at stake here. Recent studies linking various health and economic impacts of environmental contamination should be enough to give any policymaker pause: the connection between certain pesticides and Parkinson's, the correlation between elevated lead in gasoline with crime rates and the finding that pregnant women who were exposed to high levels of diesel particulates were twice as likely to have an autistic child. In our necessary mission to grow the economy, we cannot neglect environmental stewardship; the price we pay is much greater than we can afford, both in terms of dollars and human lives.

This is no zero-sum game. In fact, the more our economy grows, the better we ought to be able to protect the planet—and ourselves. Recently economists have hypothesized what is called the “environmental Kuznets curve,” which shows that after a certain point in a country's development, GDP continues to grow even as the level of environmental pollutants decreases. To use just one example, between 1970 and 2006, U.S. GDP grew by 195 percent, yet thanks to regulatory changes annual emissions of carbon monoxide, nitrogen oxide, sulfur dioxide, and lead all decreased significantly.

I remain confident that economic prosperity and environmental protection are not mutually exclusive goals, and as soon as my party recognizes the exorbitant economic costs of *not* acting on climate change, I believe we will start to make progress. It is imperative that Congress make this issue a priority. I only hope it's not already too late.

Christine Todd Whitman, former governor of New Jersey and administrator of the U.S. Environmental Protection Agency, is president of the Whitman Strategy Group.

Additional credits:

 Lead image by Getty.

**Statement of the Honorable William K. Reilly
before the
Senate Committee on Environment and Public Works
Subcommittee on Clean Air and Nuclear Safety
Washington, D.C.
June 18, 2014**

Mr. Chairman, Members of the Subcommittee,

Thank you for convening this session on one of the critical challenges our country faces. It is a privilege to appear with two of my predecessors—three if you count Ruckelshaus twice!—and Governor Whitman, who served after us.

Each of us, during our tenures, had to navigate the complexities of law, science, economics, public policy, the prevailing winds of politics and public sentiments, and more on any number of difficult issues to fulfill the intent of Congress and Americans' aspirations for both a healthy, productive environment and a prosperous economy. We did so in what Bill called a "fishbowl," all of it out in the open.

After I was nominated, my first briefing was on climate by Frank Press, president of the National Academy of Sciences, followed soon by briefings on EPA's reports on climate effects and policy options, commissioned by Administrator Thomas. At that time, climate science was a matter of computer modeling coupled with theory, notably the "greenhouse effect," which I'm sure you appreciate explains why the earth's atmosphere is hospitable to life. At the time, the concern was sufficient to prompt then-Secretary of State Jim Baker in his first statement on the topic to signal a policy of "no regrets"—we will consider those measures that address current priorities that also help reduce greenhouse gas emissions. The 1987 Montreal Protocol, which Lee helped negotiate, is an example of this kind of thinking.

With this as backdrop, President George H.W. Bush ensured that our Administration took climate change seriously. I met regularly with my counterparts from the European Union to discuss content, timing, targets, and other key issues. We hosted a major conference during the

President's term. And we negotiated with other countries the Framework Convention on Climate Change, which the President signed at the Rio Earth Summit in 1992 and submitted to the Senate for ratification, which occurred in October 1992. The Framework Convention remains, for the United States, the most important international treaty in effect on climate change.

That was 25 years ago. Today, the models are far more reliable and they are buttressed by literally thousands of credible scientific studies documenting changes underway. I hasten to add there are still many outstanding questions—the pace of change, tipping points, local impacts, fugitive methane emissions, and more. Earth's climate is a complex system and we do not have a complete picture. We welcome serious, constructive critiques that examine gaps, anomalies, uncertainties. That is how science advances our understanding of such complex issues.

That said, change is underway and we can expect to see many more disruptions, more intense storms, more wildfires, the spread of pests and diseases, storm surges that overwhelm coastal communities, heat waves, and other impacts on our health, on water resources, on food production, and on other sectors of our economy. The longer we delay, the more adverse the impacts will be, and the more expensive to address them.

Reducing greenhouse gas emissions, especially carbon dioxide, can help fend off more draconian impacts later this century. Yet I increasingly believe that we have a second, immediate agenda, namely to prompt states and communities and our federal agencies to begin to adapt to likely changes and to build up resiliency. If you read the *Washington Post's* June 1st front-page story on Norfolk, Virginia, you get an excellent picture of the dilemma that community faces—not to mention what the Navy's base there faces. Dealing with flooding and meeting future projections from storm surges will be costly, and the growing demands on federal, state, and local budgets come at a time when the country seeks to reduce federal debt and tame federal deficits.

In other words, not only is climate change likely to affect natural resources and public health, but it will have profound effects on our economy.

We have to take seriously that climate change and the associated disruptions are a global problem, as Members of Congress, policymakers, scientists, and virtually everyone I know have explicitly acknowledged. Absent action by China, India, and other fast-growing economies, what we do alone will not suffice. Action by the United States, if not sufficient, is nonetheless absolutely necessary if we are to have the credibility to negotiate with other countries, who typically fault the developed world for causing the problem and worry that carbon constraints will thwart their legitimate need for economic growth. We have to take this need for development seriously and frame our approach in the international arena with this in mind.

In this international context, I must express some disappointment that the debate between developed and developing countries has tended to focus more on how much financial aid advanced nations are willing to provide rather than on the substance of how much and how to reduce greenhouse gas emissions in those nations. I have participated for years in the China Sustainable Energy Forum; at first, any mention of climate change triggered a lecture about how those who caused the problem should pay for fixing it globally. That has changed: as China has begun to experience serious impacts, especially in water resources, you now hear China's officials and academics taking the matter very seriously. It is now a matter of national self-interest that they respond and join constructively in international negotiations even as they continue to assert their national interest in development.

Markets the world over eagerly seek clean energy technologies. Well over a billion people do not have electricity. For many, it will be small-scale, renewable technologies that will help improve their lives, offer new economic opportunities, preserve essential medicines and reduce food waste as refrigeration becomes possible, and more.

Technology and innovation are a comparative advantage for our country that will help control what we can and help find ways to replace the most serious contributors to the climate challenge. This is an enormous opportunity for U.S. entrepreneurs and exporters even as we deploy more clean energy at home. Former Iowa Governor Chip Culver made wind power a priority and that state went from 5% to 20% of electricity generation from wind power in 5 years; importantly, the state attracted turbine and other manufacturers, which in turn spawned 200 new small businesses in their supply chains. When the Governor asked the companies what they most needed, the response was worker training and education. We can learn from this experience.

We have the know-how, the ingenuity, the entrepreneurial spirit, the ability to demonstrate leadership in tackling this challenge. While the President has taken many important steps, a full and constructive response is needed from Congress, and I encourage you and your colleagues to have the kinds of discussions that will lead to congressional action.

In closing, I have little doubt that the planet will endure major climate disruptions. As scientists have confirmed, there have been many such episodes in the past due to natural causes—changes in solar output, shifts in the earth’s orbit, meteor impacts, volcanic eruptions, and the like. But you would have to reject the “greenhouse effect” outright to conclude that human activities pumping millions of tons of CO₂ and other greenhouse gases into the atmosphere every year are having little or no impact on the earth’s climate. That is simply not a tenable position. For me, the real question is about the future well-being of our communities, our settlements, our economy—in short, how hospitable this earth remains for future generations and for civilization as we know it.

Thank you.

Statement of the Honorable Lee M. Thomas
Former Administrator, U.S. Environmental Protection Agency
before the
United States Committee on Environment and Public Works
Subcommittee on Clean Air and Nuclear Safety
Washington, D.C.
June 18, 2014

Good morning, and thank you for the opportunity to contribute to the deliberations of this Subcommittee.

I am pleased to be here to offer a perspective on climate change based upon my experience at the Environmental Protection Agency dealing with similar issues. I've approached the issue using a risk assessment and risk management process. This is the approach I used during my time at EPA as we addressed a range of environmental problems.

Whether it was assessing the impact of stratospheric ozone depletion caused by Chlorofluorocarbons, or the impact of lead in gasoline on children's health, scientific data and analysis were the first step in evaluating the risk posed by the problem.

During my six years at the Environmental Protection Agency I dealt with many contentious issues, first as Assistant Administrator and later as Administrator. As Assistant Administrator, challenges involved implementing the new Superfund statute and working with Congress on reauthorizing and putting into effect law on the disposal of hazardous waste and leaking underground storage tanks. Then as Administrator, addressing major environmental issues. I can't remember any of the matters I dealt with during my tenure at the Environmental Protection Agency that were not controversial, some more so than others, ranging from setting safe drinking water standards to clean air requirements.

The issue of climate change is one that the EPA and the global scientific community have studied and analyzed for decades. And since my time as Administrator, the assessment of risk global warming poses to public health and the environment has continually improved and become more certain. Whether it is the Intergovernmental Panel on Climate Change, or the latest scientific valuation authorized by Congress, the National Climate Assessment, there is clear evidence regarding climate change and its anthropogenic foundation.

We know that carbon dioxide concentrations in the atmosphere have increased by 40 percent since pre-industrial times.

We know that carbon dioxide and other greenhouse gases are warming the atmosphere, contributing to a more than 1.5°F rise in global temperatures since 1880.

We know global sea level has risen by an average of eight inches since 1870 primarily from thermal expansion caused by warmer oceans and the melting of glaciers and the Greenland and West Antarctic ice sheets.

We know that ocean acidification is occurring, harming our coral reefs and marine ecosystems. Absorbing about a quarter of our emissions each year, the current rate of acidification is roughly 50 times faster than known historical change.

We know that communities in our country are already dealing with the effects of the changing climate today. In my state of Florida, we see increasing salt water intrusion infiltrating our drinking water supply due to sea level rise. Coastal communities are dealing with the impact sea level rise is having on their drainage systems, resulting in an investment of more than \$300 million to upgrade flood mitigation infrastructure in Miami Beach alone. The economic impact is undeniable, and local governments struggle to address today's impacts of climate change while trying to anticipate the increased risk it poses in the future.

On a broader scale, scientific analysis of the issue points to widespread impacts across our country. They range from depleted shellfish harvests in the Pacific Northwest due to ocean acidification, to increased drought and wildfires in the Southwest and a more than 70 percent rise in the occurrence of heavy downpours in the Northeast since the late 1950s.

Given this assessment of the impacts and risk posed by global warming, the EPA has the responsibility given to it by Congress, and affirmed by the courts, to address the risk management challenge. We know there are many approaches that can be taken, and all are controversial. We know the gases we have emitted will remain in the atmosphere for decades to centuries, and recognize that the solution will require a long-term commitment if we are to mitigate both the effects already occurring and those forthcoming.

But we also know what many of the solutions are, like improving energy efficiency and increasing our reliance on low-emission energy production. Widespread adoption of strategies like these can supplement an international agreement to reduce emissions. In addition, a coordinated national and international approach is needed to assist states and countries implement adaptation measures dealing with the impacts of climate change already taking place today.

Clearly more action is needed to address the impacts today while addressing the larger issue of committing ourselves to avoiding dangerous levels of future warming. The recent steps taken by the EPA to reduce greenhouse gas emissions are significant mitigation measures and once again position the US to demonstrate international leadership on an issue of global significance and consequence.

Thank you again for the opportunity to present my views to the Subcommittee on this critically important issue.

Testimony of DANIEL B. BOTKIN

Before the United States Senate Subcommittee on Clean Air and Nuclear Safety

“Climate Change: The Need to Act Now.”

June 18, 2014 at 10:00 A.M.

Since 1968, I have published research on theoretical global warming, its potential ecological effects, and the implications for people and biodiversity. Some examples: In 1970, I developed the first computer model of forests used in many versions around the world from then to the present to forecast possible climate change effects on forests. In the 1980s, one of my graduate students added world vegetation to a major climate model. In 2010, I published a paper comparing century Arctic sea ice extent in the nineteenth with that at the end of twentieth century. I have a paper in press giving the first statistically valid estimates of forest carbon sequestering for large areas of the Earth.

I have spent my career trying to help conserve our environment and its great diversity of species. Some examples: When the Marine Mammal Protection Act was passed in 1973, the Commission asked me to analyze the law and explain its key concepts both ecologically and legally; I served on a California State Committee to advise what to do about the then 22 condors remaining in the wild; Under a special bill passed by the Oregon State Legislature, I directed a five year study of the relative effects of forest practices on salmon; Under a special bill passed by the California State Legislature, I directed a study concerning Mono Lake, whose supply of fresh water had been completely diverted to Los Angeles: at the request of the city of Los Angeles, I wrote a report concerning the use of trees, shrubs and other vegetation in a city in a semi-arid environment; I have advised the Scientific Committee of the International Whaling Commission; served as the U. S. representative of the International Union for the Conservation of Nature. I have published 14 books about nature and people including one of the leading environmental science textbooks.

I have always attempted to maintain an objective, intellectually honest, scientific approach in the

best tradition of scientific endeavor and have been dismayed and disappointed in recent years that this subject has been converted into a political and ideological debate. I have colleagues on both sides of the debate and believe we should work together as scientists instead of arguing divisively about preconceived, emotionally-based “positions.” I hope my testifying here will help lead to a calmer, more rational approach to dealing with not only climate change but also other major environmental problems. The IPCC 2014 report and the White House Climate Change Assessment do not have this kind of rational discussion we should be having. I would like to tell you why.

The IPCC 2014 report is actually a series of reports, each long, complex in organization, and extensive in scope. The White House Report is 881 pages. Since it’s not possible to discuss these documents thoroughly in detail today, I will highlight some of my thoughts for you here as they relate to the reports, hoping to bring a saner, more sober approach to this highly charged issue.

To characterize where we are with these reports and this issue, I would like to quote James R. Schlesinger, the first U.S. Energy Secretary, who said: “*We have only two modes — complacency and panic.*”—commenting on the country’s approach to energy (1977).

Now to my major points.

1. **I want to state up front that we have been living through a warming trend driven by a variety of influences.** However, it is my view that this is not unusual, and contrary to the characterizations by the IPCC and the National Climate Assessment, these environmental changes are neither apocalyptic nor irreversible.
2. **My biggest concern is that both the reports present a number of speculative, and sometimes incomplete, conclusions embedded in language that gives them more scientific heft than they deserve.** The reports are “scientific-sounding” rather than based on clearly settled facts or admitting their lack. Established facts about the global environment exist less often in science

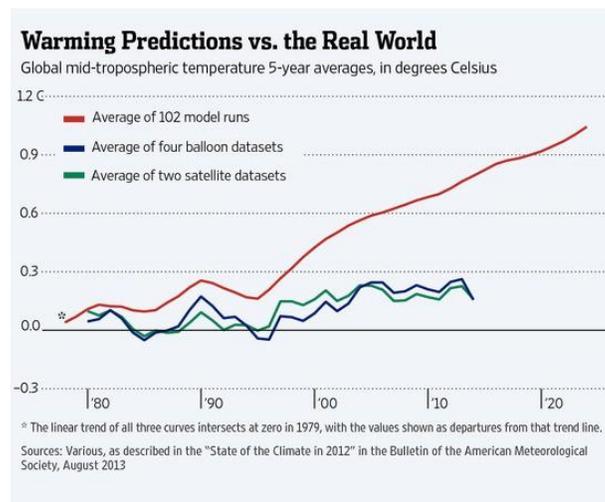
than laymen usually think.

3. **HAS IT BEEN WARMING? Yes, we have been living through a warming trend, no doubt about that.** The rate of change we are experiencing is also not unprecedented, and the “mystery” of the warming “plateau” simply indicates the inherent complexity of our global biosphere. Change is normal; life on Earth is inherently risky. It always has been. The two reports, however, makes it seem that environmental change is apocalyptic and irreversible. It is not.
4. **IS CLIMATE CHANGE VERY UNUSUAL? No, it has always undergone changes.**
5. **ARE GREENHOUSE GASES INCREASING? Yes, CO2 rapidly.**
6. **IS THERE GOOD SCIENTIFIC RESEARCH ON CLIMATE CHANGE? Yes, a great deal of it.**
7. **ARE THERE GOOD SCIENTISTS INVOLVED IN THE IPCC 2014 REPORT?** Yes, the lead author of the Terrestrial (land) Ecosystem Report is Richard Betts, a coauthor of one my scientific papers about forecasting effects of global warming on biodiversity.
8. **ARE THERE SCIENTIFICALLY ACCURATE STATEMENTS AT PLACES IN THE REPORT? Yes, there are.**
9. **What I sought to learn was the overall take-away that the reports leave with a reader.** I regret to say that I was left with the impression that the reports overestimate the danger from human-induced climate change and do not contribute to our ability to solve major environmental problems. I am afraid that an “agenda” permeates the reports, an implication that humans and our activity are necessarily bad and ought to be curtailed.
10. **ARE THERE MAJOR PROBLEMS WITH THE REPORTS? Yes, in assumptions, use of data, and conclusions.**
11. **My biggest concern about the reports is that they present a number of speculative, and**

sometimes incomplete, conclusions embedded in language that gives them more scientific heft than they deserve. The reports, in other words, are "scientific- sounding," rather than clearly settled and based on indisputable facts. Established facts about the global environment exist less often in science than laymen usually think.

12. **The two reports assume and/or argue that the climate warming forecast by the global climate models is happening and will continue to happen and grow worse. Currently these predictions are way off the reality** (Figure 1). Models, like all scientific theory, have to be tested against real-world observations. Experts in model validation say that the climate models frequently cited in the IPCC report are little if any validated. This means that as theory they are fundamentally scientifically unproven.

13. **Figure 1: Climate model forecasts compared to real world temperature observations** (From John Christy, University of Alabama and Alabama State Climatologist. Reproduced with permission from him.)



14. **The reports suffer from the use term "climate change" with two meanings: natural and human-induced. These are both given as definitions in the IPCC report and are not distinguished in the text and therefore confuse a reader.** (The White House Climate Change

Assessment uses the term throughout including its title, but never defines it.) There are places in the reports where only the second meaning—human induced—makes sense, so that meaning has to be assumed. There are other places where either meaning could be applied.

- a. In those places where either meaning can be interpreted, if the statement is assumed to be a natural change, then it is a truism, a basic characteristic of Earth's environment and something people have always known and experienced. If the meaning is taken to be human-caused, then in spite of the assertions in the report, the available data do not support the statements.

15. Some of the reports' conclusions are the opposite of those given in articles cited in defense of those conclusions. For example, the IPCC 2014 Terrestrial Ecosystem Report states that “there is medium confidence that rapid change in the Arctic is affecting its animals. For example, seven of 19 subpopulations of the polar bear are declining in number” citing in support of this an article by Vongraven and Richardson, 2011. That report states the contrary, that the “decline’ is an illusion.

In addition, I have sought the available counts of the 19 subpopulations. Of these, only three have been counted twice; the rest have been counted once. Thus no rate of changes in the populations can be determined. The first count was done in 1986 for one subpopulation.¹

On May 22, Vongraven, a member of the international team that created these estimates, stated that the polar bear population size, “never has been an estimate of total abundance in a scientific sense, but simply a qualified guess given to satisfy public demand...the range given for total global population should be viewed with great caution as it cannot be used to assess population trend over the long term.” The U. S. Marine Mammal Commission, charged with the conservation of this species, acknowledges “*Accurate estimates of the current and historic sizes of polar bear stocks are*

difficult to obtain for several reasons—the species ‘inaccessible habitat, the movement of bears across international boundaries, and the costs of conducting surveys.’”²

According to Dr. Susan Crockford, “out of the 13 populations for which some kind of data exist, five populations are now classified by the PBSG [IUCN/SSC Polar Bear Specialist Group] as ‘stable’ (two more than 2009), one is still increasing, and three have been upgraded from ‘declining’ to ‘data deficient’ That leaves four that are still considered ‘declining’ - two of those judgments are based primarily on concerns of overhunting, and one is based on a statistically insignificant decline that may not be valid and is being reassessed (and really should have been upgraded to ‘data deficient’). That leaves only one population – Western Hudson Bay – where PBSG biologists tenaciously blame global warming for all changes to polar bear biology, and even then, the data supporting that conclusion is still not available.”³

16. Some conclusions contradict and are ignorant of the best statistically valid

observations. For example, the Terrestrial Ecosystems Report states that “terrestrial and freshwater ecosystems have sequestered about a quarter of the carbon dioxide emitted to the atmosphere by human activities in the past three decades (high confidence).” I have done the first statistically valid estimate of carbon storage and uptake for any large area of Earth’s land, the boreal forests and eastern deciduous forest of North America, and subtropical forests in Queensland, Australia. The estimates of carbon uptake by vegetation used by IPCC and in major articles cited by the reports are based on what can best be called “grab samples,” a relatively small number of studies done at a variety of times using a variety of methods, mainly in old- growth areas. The results reported by IPCC overestimate

carbon storage and uptake by as much as 300 percent.⁴

- 17. The IPCC Report for Policymakers on Impacts, Adaptation, and Vulnerability repeats the assertion of previous IPCC reports that “large fraction of species” face “increase extinction risks” (p15). Overwhelming evidence contradicts this assertion.**

And it has been clearly shown that models used to make these forecasts, such as climate envelope models and species-area curve models, make incorrect assumptions that lead to erroneous conclusions, over-estimating extinction risks. Surprisingly few species became extinct during the past 2.5 million years, a period encompassing several ice ages and warm periods.⁵ Among other sources, this is based on information in the book *Climate Change and Biodiversity* edited by Thomas Lovejoy, one of the leaders in the conservation of biodiversity.⁶ The major species known to have gone extinct during this period are 40 species of large mammals in North America and Northern Europe. (There is a “background” extinction rate for eukaryotic species of roughly one species per year.)

- 18. THE REPORTS GIVE THE IMPRESSION THAT LIVING THINGS ARE FRAGILE AND RIGID, unable to deal with change. The opposite is the case. Life is persistent, adaptable, and adjustable.**

- 19. STEADY-STATE ASSUMPTION: There is an overall assumption in the IPCC 2014 report and the White House Climate Change Assessment that all change is negative and undesirable – that it is ecologically and evolutionarily unnatural, bad for populations, species, ecosystems, for all life on planet Earth, including people. This is the opposite of the reality.** The environment has always changed and is always changing,

and living things have had to adapt to these changes. Interestingly, many, if not most, species that I have worked on or otherwise know about require environmental change.⁷

20. The IPCC Summary for Policy Makers on Impacts, Adaptation, and Vulnerability

makes repeated use of the term “irreversible” changes. A species going extinct is irreversible, but little else about the environment is irreversible. The past confirms this. Glaciers have come and gone repeatedly. The Northwest Passage of North America has gone and come again. The average temperature has greatly exceeded the present and forecasted and has declined only to rise again.

- a. Implicit in this repeated use of irreversible is the belief that Earth’s environment is constant — stable, unchanging — except when subjected to human actions. This is obviously false from many lines of evidence, including the simple experience of all people who have lived before the scientific-industrial age and those who live now and so such work as farm, manage rivers, wildlife and forests.

The extreme over-emphasis on human-induced global warming has taken our attention away from many environmental issues that used to be front and center but have been pretty much ignored in the 21st century. By my count there are ten issues, including global warming. I know it is easier for people to focus on just one issue at a time and ten seems overwhelming, but they can all be part of, and can be cast in terms of, biodiversity and sustainability. A singular focus on climate change as the driver of the other nine obscures the best solutions to the full suite of environmental challenges we face. In terms of “the need to act now” it is on these issues that we should focus, with the concern with a possible global warming prioritized properly with that group.

Environmental Issues that need our attention now

- 1. Energy**
- 2. Fresh water**
- 3. Habitat destruction**
- 4. Invasive-species control**
- 5. Direct threats to Endangered species**
- 6. Pollution by directly toxic substances**
- 7. Fisheries**
- 8. Forests**
- 9. Phosphorus and other essential minerals**

The Terrestrial report in a sense acknowledges this, for example by stating: “*Climate stresses occur alongside other anthropogenic influences on ecosystems, including land-use changes, nonnative species, and pollution, and in many cases will exacerbate these pressures (very high confidence).*”

- 21. Do the problems with these reports mean that we can or should abandon any concerns about global warming or abandon any research about it? Certainly not, but we need to put this issue within an appropriate priority with other major here-and-now environmental issues that are having immediate effects.**
22. I reviewed and provided comments on both the IPCC 2014 report and the draft White House's National Climate Change Assessment and, unfortunately, it appears that these issues have not been addressed in the final assessment. For example in regard to the White House Report, I stated:
 - a. "The executive summary is a political statement, not a scientific statement. It is filled with misstatements contradicted by well-established and well-known scientific papers."
 - b. "Climate has always affected people and all life on Earth, so it isn't new to say it is 'already affecting the American people.' This is just a political statement."

- c. "It is inappropriate to use short-term changes in weather as an indication one way or another about persistent climate change."

WHAT HAS GONE WRONG AND HOW TO FIX IT

1. **Rather than focus on key, specific and tractable aspects of climate-change science, the long-term approach throughout the 20th century was to try to create *de nova* a complete model of the climate.**
2. **This approach has been taken despite a lack of focus on monitoring key variables over time in statistically and scientifically valid ways, e. g. carbon sequestering by forests; polar bear population counts.** As a result, there is an odd disconnect between theory and observation. The attempt to create complete models of every aspect of climate has meant that many factors had to be guessed at, rather than using the best scientific methods. Too many guesses, too little checking against real, observed effects.
3. **Both reports are the result of a very large number of people doing long reviews of the scientific literature. This easily leads to people being so overburdened that they misinterpret specific papers, fail to understand where the major observational gaps are, and have trouble making an accurate list of citations and all sources of information.** The fundamental IPCC and White House Climate Change Assessment approach has been to gather a huge number of scientists from a large number of disciplines, on the assumption that a kind of crowd approach to what can be agreed on is the same as true scientific advance. While this might seem a reasonable and effective approach, there is some danger in relying on this "crowd-sourced" model of information sharing. Groups of people, particularly when credentialed "experts" are involved, are very prone to a condition called an "information cascade" in which error is compounded by group

think, assumptions become unchallenged “fact” and observations play second fiddle to unchallenged models. The excellent scientists involved with the IPCC reports are no less prone to this than the excellent scientists who relied on Aristotelian models of a geocentric universe. Entrenched beliefs are hard to extricate, even amongst supposedly rational thinkers. This is probably in part responsible for the problems listed with the White House Climate Assessment report’s table of Biological Effects, discussed later.

4. **What a scientist discovers is different from what a scientist says. The first is science, the second is opinion.** Have small groups of scientists work on this problem, no more than can easily argue with one another, that is less than 20 and preferably even smaller, representing the primary disciplines. Divide the problem into areas, rather than try to answer all questions in one analysis. I have used this approach in my own work and found it to be successful.^{8, 9}
5. **The desire to do good has ironically overridden the desire to do the best science.**
6. **Under the weight of this kind of crowd rule and approach, some specific alternative approaches to the science of climate change, have not been allowed to rise to the surface.**
7. **Among the approaches that would improve climate science:**
 1. Return to the former reliance on science done by individuals and small groups with a common specific interest and focus.
 2. Change the approach from trying to make a complete, definitive model of every aspect of climate to a different level. See kinds of models that explore specific possibilities and phenomena.
 3. Get out of the blame game. None of the above suggestions can work as long as

global warming remains a moral, political, ideologically dominated topic, with scientists pushed into, or at least viewed as, being either for or against a single point of view.

9. **We need to focus again on major environmental Issues that need our attention now** (see the list above).

10. **ARE THERE EXAMPLES OF THE KIND OF RESEARCH I BELIEVE WE NEED MORE OF? YES.**

- a. NASA Carbon Monitoring System (CMS)
- b. Hubbard Brook Ecosystem Study
- c. Whooping Crane monitoring, e.g. of an endangered species
- d. In-place monitoring on carbon flux, being done by the USGS in the Great Cypress Swamp, Florida.
- e. Many others.

NOTES For the general discussion of both the IPCC 2014 and the White House Climate Change Assessment. (A second section dealing directly with the White House Assessment has its own note section.)

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2. <http://www.mmc.gov/species/pdf/ar2000polarbear.pdf> P. 91.
3. Crockford, S., 2014. Polar Bear Science website <http://polarbearscience.com/2014/03/20/polar-bear-status-changes-in-2013-deconstructed-with-a-map-to-the-good-news/>
4. Botkin, D. B. and L. Simpson, 1990, Biomass of the North American Boreal Forest: A step toward accurate Global Measures: *Biogeochemistry* 9:161-174; Botkin, D. B., Simpson, L. G., and H. J. Schenk, 1992, Estimating Biomass, *Science Letters*. Vol. 257, No. 5067. (Jul. 10, 1992), pp. 146-147; Botkin, D. B., Simpson, L. G., and R. A. Nisbet, 1993, Biomass and Carbon Storage of the North American Deciduous Forest, *Biogeochemistry* 20: 1-17; Botkin, D.

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6. Lovejoy, T. E., Lee Hannah, editors. (2005). *Climate Change and Biodiversity*. New Haven, Yale University Press.

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8. Botkin, D.B., W.S.Broecker, L. G. Everett, J. Shapiro, and J. A. Wiens, 1988, *The Future of Mono Lake*, California Water Resources Center, University of California, Riverside, Report #68.

9. Botkin, D. B., Henrik Saxe, Miguel B. Araújo, Richard Betts, Richard H.W. Bradshaw, Tomas Cedhagen, Peter Chesson, Terry P. Dawson, Julie Etterson, Daniel P. Faith, Simon Ferrier, Antoine Guisan, Anja Skjoldborg Hansen, David W. Hilbert, Craig Loehle, Chris Margules, Mark New, Matthew J. Sobel, and David R.B. Stockwell. 2007 "Forecasting Effects of Global Warming on Biodiversity." *BioScience* 57(3): 227-236.

SPECIFIC REVIEW OF *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program

Jerry M. Melillo, Terese (T.C.) Richmond, and Gary W. Yohe, Eds.

841 pp. doi:10.7930/JOZ31WJ2.

[Note regarding my connections with Jerry M. Melillo, one of the three primary editors of this report: When I was on the faculty of the Yale School of Forestry and Environmental Studies, Jerry Melillo was a graduate student working on his doctorate and we interacted frequently. Beginning in 1975, Jerry Melillo and I worked at the Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA, and we published four scientific papers together, listed at the end of this document.¹

COMMENTS ON THE ASSESSMENT

GENERAL COMMENTS:

The opening statement of the Assessment (p.1), reproduced here, is characteristic of the entire Assessment in that it violates one of the basic principles of good climatology --- never use short-term weather changes as proof of climate change. Climatologists I have worked with over the decades have said this repeatedly. In 1962, when I was a graduate student at the University of Wisconsin working under a science writing fellowship, I spoke with Reed Bryson, said to be the father of the International Geophysical Year and the person who persuaded Richard Keeling to begin measuring atmospheric carbon dioxide concentration on Mauna Loa, Hawaii. At that time Earth had been undergoing a global cooling since about 1940. At first Professor Bryson said “if present trends continue, we are entering a new ice age.” But when I drafted a press release that quoted him so, he thought about it carefully and told me that we could not make that statement, because this was just a short- term weather event.

In the 1980s, I worked closely with climatologist Stephen Schneider and we often gave talks at the same events. Steve, one of the leaders of the modern concern about a possible human-induced global warming, also said that you should never use short-term weather events to infer climate change. I agreed with these experts, and therefore was taken aback by the overall tone of the new White House Climate Change Assessment, which begins: “Climate change, once considered an issue for a distant future, has moved firmly into the present. Corn producers in Iowa, oyster growers in Washington State, and maple syrup producers in Vermont are all observing climate-related changes that are outside of recent experience. So, too, are coastal planners in Florida, water managers in the arid Southwest, city dwellers from Phoenix to New York, and Native Peoples on tribal lands from Louisiana to Alaska. This National Climate Assessment concludes that the evidence of human-induced climate change continues to strengthen and that impacts are increasing across the country.

Based on what my climatologist colleagues had always told me, the Assessment should have begun instead by stating: “Corn producers in Iowa, oyster growers in Washington State, and maple syrup producers in Vermont are all observing weather-related changes” outside of their

personal recent experience. So, too, are coastal planners in Florida, water managers in the arid Southwest, city dwellers from Phoenix to New York, and Native peoples on tribal lands from Louisiana to Alaska.”

The Assessment concludes that opening paragraph by stating: *This National Climate Assessment concludes that the evidence of human-induced climate change continues to strengthen and that impacts are increasing across the country.*

Americans are noticing changes all around them. Summers are longer and hotter, and extended periods of unusual heat last longer than any living American has ever experienced. Winters are generally shorter and warmer. Rain comes in heavier downpours. People are seeing changes in the length and severity of seasonal allergies, the plant varieties that thrive in their gardens, and the kinds of birds they see in any particular month in their neighborhoods (p.1).

These opening paragraphs and several that follow directly communicate to the reader, both lay and professional, that human-induced global warming in an immediate disaster. For example:

Other changes are even more dramatic. Residents of some coastal cities see their streets flood more regularly during storms and high tides. Inland cities near large rivers also experience more flooding, especially in the Midwest and Northeast. Insurance rates are rising in some vulnerable locations, and insurance is no longer available in others. Hotter and drier weather and earlier snowmelt mean that wildfires in the West start earlier in the spring, last later into the fall, and burn more acreage. In Arctic Alaska, the summer sea ice that once protected the coasts has receded, and autumn storms now cause more erosion, threatening many communities with relocation.

Scientists who study climate change confirm that these observations are consistent with significant changes in Earth’s climatic trends. Long-term, independent records from weather stations, satellites, ocean buoys, tide gauges, and many other data sources all confirm that our nation, like the rest of the world, is warming. Precipitation patterns are changing, sea level is rising, the oceans are becoming more acidic, and the frequency and intensity of some extreme weather events are increasing (p. 1).

To be scientifically accurate, these paragraphs should instead have been written (my changes noted by underlining): *Other weather changes are even more dramatic. Residents of some coastal cities see their streets flood more regularly during storms and high tides. Inland cities near large rivers also experience more flooding, especially in the Midwest and Northeast. Insurance rates are rising in some vulnerable locations, and insurance is no longer available in others. Hotter and drier weather and earlier snowmelt mean that wildfires in the West start earlier in the spring, last later into the fall, and burn more acreage. In Arctic Alaska, the summer sea ice that once protected the coasts has receded, and autumn storms now cause more erosion, threatening many communities with relocation. Scientists who study weather and climate change point out that short-term, including several decades and longer, changes in weather do not confirm that these observations are consistent with significant changes in Earth's climatic trends.*

These opening statements are directly followed by: *Many lines of independent evidence*

demonstrate that the rapid warming of the past half-century is due primarily to human activities. The observed warming and other climatic changes are triggering wide-ranging impacts in every region of our country and throughout our economy. Some of these changes can be beneficial over the short run, such as a longer growing season in some regions and a longer shipping season on the Great Lakes. But many more are detrimental, largely because our society and its infrastructure were designed for the climate that we have had, not the rapidly changing climate we now have and can expect in the future. In addition, climate change does not occur in isolation. Rather, it is superimposed on other stresses, which combine to create new challenges (p. 1). **The assertions in this paragraph are based on the forecasts from climate models and from temperature records. However, Figure 1 shows that the climate models greatly exaggerate the rate and amount of temperature change and are not making forecasts that come even close to fitting the data. Furthermore, Figure 1 also shows that the average Earth temperature in the past 30 years has changed very little if at all, contradicting the assertions on the first page of the Assessment.**

The Assessment further attributes the supposed climatic warming to human activities that are releasing greenhouse gases, especially carbon dioxide, into the atmosphere. Therefore the claimed disaster is our fault. But recent evidence shows that temperature change is not tracking the increase in carbon dioxide. The gas has increased from 370 ppm to just over 400ppm, 8 percent, between year 2000 and year 2014 (Figure 2), while the temperature has changed either only slightly or not at all, depending on how one does the analysis (Figure 3). Instead, temperature change tracks closely changes in the energy output from the sun (Soon, W. and D. R. Legates, *Solar irradiance modulation of Equator-to-Pole (Arctic) temperature gradients: Empirical evidence for climate variation on multi-decadal timescales*. Journal of Atmospheric and Solar-Terrestrial Physics, 2013. **93**: p. 45-56.)

Figure 2. Mauna Loa Observatory CO₂ measurements

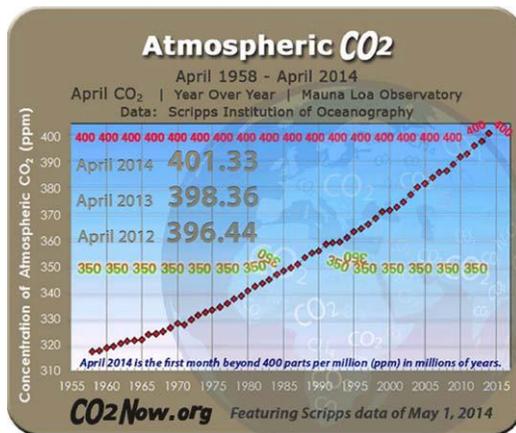
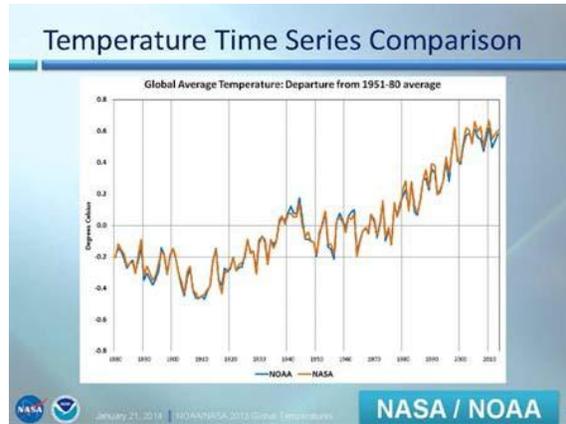


Figure 3. Earth Surface Temperature Departure from 1950-1980 Average



The current evidence from scientific observations shows that Earth’s temperature has not changed very much, if at all, since the start of the new century, while carbon dioxide has increased considerably.

Given these facts, the basic opening assertions of the new U.S. Climate Change Assessment are about a hypothetical world, not a real world, and must be taken as a “what if” rather than “what is”. Therefore the dire consequences forecast in the Assessment cannot be taken as reliable, nullifying many, if not most, of the ecological and biological implications the Assessment makes heavy use of.

The time available to write and the space available to publish as written testimony prevent a comprehensive, detailed review of the entire White House Climate Change Assessment. As a result, I have used as an example of the kinds of problems throughout the Assessment the table appearing on pages 204-5, *Biological Responses To climate Change*. As an ecologist, I have taken that table and reorganized it. This reorganization follows.

Although the document is titled “Climate Change Assessment,” the term “climate change” is not defined and is in fact used with two meanings, natural and human-induced. There are places in the Assessment where only the second meaning makes sense, so that meaning has to be assumed. There are other places where either meaning could be applied. In those places where either meaning can be interpreted, if the statement is assumed to be a natural change, then it is a truism, a basic characteristic of Earth’s environment and something people have always known and experienced. If the meaning is taken to be human-caused, then in spite of the assertions in the Assessment, the available data do not support the statements.

For example, the Assessment’s section titled *CLIMATE CHANGE AND THE AMERICAN PEOPLE* begins with the statement: *Climate change, once considered an issue for a distant future, has moved firmly into the present. Corn producers in Iowa, oyster growers in*

Washington State, and maple syrup producers in Vermont are all observing climate-related changes that are outside of recent experience.

If this is to be interpreted as natural, then people have frequently in history experienced “climate-related changes that are outside of [their] recent experiences,” as the Medieval Warming and Little Ice Age demonstrate,^{2, 3, 4} and therefore it is not unusual nor unexpected in ordinary life. If this is to be interpreted to be human-induced, then the evidence just discussed demonstrates that this kind of change cannot be attributed to human actions and therefore the statement is false.

ANALYSIS OF THE CLIMATE CHANGE IMPACTS ASSESSMENT TABLE OF ECOLOGICAL EFFECTS, titled Biological responses to climate change (Assessment’s pages 204-205)

The Assessment presents a list of 30 biological responses to climate change. Since this is my particular area of expertise, I have analyzed this list and sorted the items into the following categories: **Where the Assessment is wrong** based on my understanding (10 items); **Improvements** (12 items); **Declines** (which can be taken as worsening) (No items); **Predicted from Climate Models**, Therefore Not Fact, especially given the failure of climate models to forecast with any reliability Earth’s increase in temperature since the 1990s (see figure 1) (3 items); and **Unlikely or Unsupported Statement** (5 items). **Within the context of the Assessment, this table comes across as meaning to demonstrate more very negative effects of a human-induced global warming, but since upon analysis none of the 30 appears to be a legitimately supported decline that might occur under a hypothetical global warming or have been directly observed, this table in fact is an argument against the overall message of the Assessment.**

(The number that appears at the beginning of each entry is the number in the Assessment’s list. The numbers following each of the Assessment’s entry are the citation number as listed in the Assessment. The Assessment’s statements are in italics; my comments appear in plain font.)

ASSESSMENT IS WRONG

1. *21. Seedling survival of nearly 20 resident and migrant tree species decreased during years of lower rainfall in the Southern Appalachians and the Piedmont areas, indicating that reductions in native species and limited replacement by invading species were likely under climate change.*¹³⁴ Since the climate models are admittedly weak about changes in rainfall, this statement has no relevance to purported human-induced global warming.
2. *27. Water temperature data and observations of migration behaviors over a 34-year time period showed that adult pink salmon migrated earlier into Alaskan creeks, and fry advanced the timing of migration out to sea. Shifts in migration timing may increase the potential for a mismatch in optimal environmental conditions for early life stages, and continued warming trends will likely increase pre-spawning mortality and egg mortality rates.*⁸⁷ Salmon have evolved and are adapted to environmental change.
3. *3. Conifers in many western forests have experienced mortality rates of up to 87% from warming-induced changes in the prevalence of pests and pathogens and stress from drought.*¹¹⁸ Important causes of the mortality of trees in western forests are: fire suppression, which promotes insect and disease outbreaks, and from introduced

- (invasive) insects and diseases.
4. 8. *Warmer and drier conditions during the early growing season in high-elevation habitats in Colorado are disrupting the timing of various flowering patterns, with potential impacts on many important plant-pollinator relationships.*⁷⁷ “Disrupting” is a politically loaded term. The scientific term would be “changed” and this is a good sign, showing the adaptability of species to changing environments.
 5. 12. *Variation in the timing and magnitude of precipitation due to climate change was found to decrease the nutritional quality of grasses, and consequently reduce weight gain of bison in the Konza Prairie in Kansas and the Tallgrass Prairie Preserve in Oklahoma.*¹²⁴ Results provide insight into how climate change will affect grazer population dynamics in the future. This is stated in a way that is not open to scientific evaluation. No doubt lower rainfall has negative effects, but the statement is “variation.” In fact, the publication cited (Craine et al., 2008)⁵ states that “Greater late-summer precipitation increased bison weight gain . . . “greater midsummer precipitation decreased weight gain.” This is a scientifically interesting result for those focused on wildlife in grasslands, but it is neither a negative nor positive in terms of global warming, because the forecasting models are weakest in forecasting rainfall even annually, let alone seasonally. Therefore these results cannot be taken as negative (nor positive) effects of a global rise in average temperature.
 6. 10. *Cutthroat trout populations in the western U.S. are projected to decline by up to 58%, and total trout habitat in the same region is projected to decline by 47%, due to increasing temperatures, seasonal shifts in precipitation, and negative interactions with nonnative species.*⁸ Stresses on Cutthroat extend considerably beyond climate change and have to do with fishing intensity, water diversions and other habitat changes, such as competition from introduced, invasive species such as lake trout and rainbow trout.⁶
 7. 28. *Warmer springs in Alaska have caused earlier onset of plant emergence, and decreased spatial variation in growth and availability of forage to breeding caribou. This ultimately reduced calving success in caribou populations.*¹³⁸ The implication is that warming will necessarily have a negative effect on caribou, but the paper cited (Post et al., 2008) actually is much more cautious, stating “it is highly relevant to herbivore ecology to consider the manner in which warming will alter spatial patterns of plant phenology at more immediate spatial scales than that of the regional landscape. The paper concludes, cautiously: “Large herbivores prefer newly emergent forage, presumably owing to the high digestibility and nutrient content of young plant tissues . . . future warming could conceivably impair the ability of herbivores such as caribou to forage selectively, with adverse consequences for their productivity. We suggest, therefore, that it is highly relevant to herbivore ecology to consider the manner in which warming will alter spatial patterns of plant phenology at more immediate spatial scales than that of the regional landscape.”⁷

There is again an inherent assumption that a steady-state between living things and climate is natural and necessary for a species’ persistent. Wildlife population can and do adjust to changes, but this can take some time. See the examples of current adjustments, which I have added below this table. Give the populations a little time to adjust.

8. *26 Changes in female polar bear reproductive success (decreased litter mass and numbers of yearlings) along the north Alaska coast have been linked to changes in body size and/or body condition following years with lower availability of optimal sea ice habitat.*¹³⁷ There is evidence that polar bears are adjusting by feeding more on terrestrial prey. Contrary to the publicity about polar bears, there is little information demonstrating any statistically, scientifically valid decline in polar bear populations. I have sought the available counts of the 19 subpopulations. Of these, only three have been counted twice; the rest have been counted once. Thus no rate of change in the population is possible. The first count was done 1986 for one subpopulation.⁸
9. *7. Quaking aspen-dominated systems are experiencing declines in the western U.S. after stress due to climate induced drought conditions during the last decade.*¹²² Anderegg, W. R. L., J. M. Kane, and L. D. L. Anderegg, 2012: *Consequences of widespread tree mortality triggered by drought and temperature stress. Nature Climate Change, 3, 30-36, doi:10.1038/nclimate1635.* Given the failure of the climate models to predict temperature change and the observed lack of a significant recent rise in temperature, it is incorrect to refer to this as a “climate induced” drought. Moreover, a thousand year tree-ring study shows that deep droughts are characteristic of California. Meteorologist Martin P. Hoerling wrote on March 8, 2014 that “At present, the scientific evidence does not support an argument that the drought there is appreciably linked to human-induced climate change.” Hoerling is a research meteorologist, specializing in climate dynamics, at the Earth System Research Laboratory of the National Oceanic and Atmospheric Administration, and the White House's National Climate Assessment cites many of Hoerling's papers, including figure 20.4 “Longer Frost-free Season Increases Stress on Crops,” so his work is respected by the authors.
10. *9. Population fragmentation of wolverines in the northern Cascades and Rocky Mountains is expected to increase as spring snow cover retreats over the coming century.*¹²³ The paper cited, Dawson et al. (2011)⁹, does not mention wolverines. And contrary to making a highly negative statement, the paper states *Populations of many species have persisted in situ at individual sites since the last glacial maximum (toleration) and many have undergone habitat shifts, moving short distances (1 to 10 km) to sites with different aspects, slopes, elevations, and other attributes as the environment changed. Migrations of 100 to 1000 km are well documented for many species.*

IMPROVEMENTS

1. *2. Northern flickers arrived at breeding sites earlier in the Northwest in response to temperature changes along migration routes, and egg laying advanced by 1.15 days for every degree increase in temperature, demonstrating that this species has the capacity to adjust their phenology in response to climate change.*¹¹⁷
2. *11. Comparisons of historical and recent first flowering dates for 178 plant species from North Dakota showed significant shifts occurred in over 40% of species examined, with the greatest changes observed during the two warmest years of the study.*⁷⁵
3. *14. Migratory birds monitored in Minnesota over a 40-year period showed significantly earlier arrival dates, particularly in short-distance migrants, indicating that some species are capable of responding to increasing winter temperatures better than*

- others.126.*
4. *15. Up to 50% turnover in amphibian species is projected in the eastern U.S. by 2100, including the northern leopard frog, which is projected to experience poleward and elevational range shifts in response to climatic changes in the latter quarter of the century.127*
 5. *16. Studies of black ratsnake (Elaphe obsoleta) populations at different latitudes in Canada, Illinois, and Texas suggest that snake populations, particularly in the northern part of their range, could benefit from rising temperatures if there are no negative impacts on their habitat and prey.128*
 6. *17. Warming-induced hybridization was detected between southern and northern flying squirrels in the Great Lakes region of Ontario, Canada, and in Pennsylvania after a series of warm winters created more overlap in their habitat range, potentially acting to increase population persistence under climate change.129*
 7. *18. Some warm-water fishes have moved northwards, and some tropical and subtropical fishes in the northern Gulf of Mexico have increased in temperate ocean habitat.130 Similar shifts and invasions have been documented in Long Island Sound and Narragansett Bay in the Atlantic.131*
 8. *23. Over the last 130 years (1880-2010), native bees have advanced their spring arrival in the northeastern U.S. by an average of 10 days, primarily due to increased warming. Plants have also showed a trend of earlier blooming, thus helping preserve the synchrony in timing between plants and pollinators.135*
 9. *24. In the Northwest Atlantic, 24 out of 36 commercially exploited fish stocks showed significant range (latitudinal and depth) shifts between 1968 and 2007 in response to increased sea surface and bottom temperatures.55*
 10. *25. Increases in maximum, and decreases in the annual variability of, sea surface temperatures in the North Atlantic Ocean have promoted growth of small phytoplankton and led to a reorganization in the species composition of primary (phytoplankton) and secondary (zooplankton) producers.136*
 11. *29. Many Hawaiian mountain vegetation types were found to vary in their sensitivity to changes in moisture availability; consequently, climate change will likely influence elevation-related vegetation patterns in this region.139*
 12. *5. In response to climate-related habitat change, many small mammal species have altered their elevation ranges, with lower-elevation species expanding their ranges and higher-elevation species contracting their ranges.120*

DECLINES

None.

PREDICTED FROM CLIMATE MODELS, THEREFORE NOT FACT

1. *30. Sea level is predicted to rise by 1.6 to 3.3 feet in Hawaiian waters by 2100, consistent with global projections of 1 to 4 feet of sea level rise (see Ch. 2: Our Changing Climate, Key Message 10). This is projected to increase wave heights, the duration of turbidity, and the amount of re-suspended sediment in the water; consequently, this will create potentially stressful conditions for coral reef communities.140*
2. *6. Northern spotted owl populations in Arizona and New Mexico are projected to decline*

during the next century and are at high risk for extinction due to hotter, drier conditions, while the southern California population is not projected to be sensitive to future climatic changes.¹²¹

3. 19. Global marine mammal diversity is projected to decline at lower latitudes and increase at higher latitudes due to changes in temperatures and sea ice, with complete loss of optimal habitat for as many as 11 species by midcentury; seal populations living in tropical and temperate waters are particularly at risk to future declines.¹³²

UNLIKELY CORRELATION OR UNSUPPORTED STATEMENT

1. 13. (a and b) Climatic fluctuations were found to influence mate selection and increase the probability of infidelity in birds that are normally socially monogamous, increasing the gene exchange and the likelihood of offspring survival. ¹²⁵
2. 20. Higher nighttime temperatures and cumulative seasonal rainfalls were correlated with changes in the arrival times of amphibians to wetland breeding sites in South Carolina over a 30-year time period (1978-2008).¹³³ Of course. The time period precedes any possible effect of human-induced global warming, and the effect is a truism. Rainfall will affect amphibians. Since the climate models are admittedly weak about changes in rainfall, this statement has no relevance to purported human-induced global warming.
3. 22. *Widespread declines in body size of resident and migrant birds at a bird-banding station in western Pennsylvania were documented over a 40-year period; body sizes of breeding adults were negatively correlated with mean regional temperatures from the preceding year.*⁸⁵ The citation for this statement is NatureServe, cited 2012: Ecosystem-based Management Tools Network. [Available online at www.ebmtools.org]. This is a general website. I used its search option and did not find bird-banding nor Pennsylvania, nor any reference to a study of bird-banding in Pennsylvania.
4. 4. *Butterflies that have adapted to specific oak species have not been able to colonize new tree species when climate change-induced tree migration changes local forest types, potentially hindering adaptation.*¹¹⁹ . The citation 119 in the Assessment is Aumen, N., L. Berry, R. Best, A. Edwards, K. Havens, J. Obeysekera, D. Rudnick, and M. Scerbo, 2013: Predicting Ecological Changes in the Florida Everglades Under a Future Climate Scenario, 33 pp., U.S. Geological Survey, Florida Sea Grant, Florida Atlantic University. [Available online at http://www.ces.fau.edu/climate_change/ecology-february-2013/PECFEFCS_Report.pdf]. I searched this report and found no mention of butterflies. This is probably an inadvertent editing error and the authors of the Assessment meant to refer to some other paper, but since this is the actual listing, the statement is unsupported.
5. 1. *Mussel and barnacle beds have declined or disappeared along parts of the Northwest coast due to higher temperatures and drier conditions that have compressed habitable intertidal space.*¹¹⁶. The citation listed is Burke, L., L. Reytar, M. Spalding, and A. Perry, 2011: Reefs at Risk Revisited. World Resources Institute, 130 pp. [Available online at http://pdf.wri.org/reefs_at_risk_revisited.pdf]. I searched this citation and did not find any mention of the words mussel or barnacle and the only mention of “northwest” was “northwestern Hawaii.” Again this is likely a typographic error, but no other statement in the Assessment brought me to a relevant paper either, so the statement

is unsupported by the report.

SOME OTHER EXAMPLES OF SPECIFIC STATEMENTS THAT ARE INCORRECT, OR OVERSTATED, OR LIMITED TO A FEW SPECIFIC CASES, OR OTHERWISE OF DOUBTFUL GENERALITY

Given the length of the just-released White House Climate Change Assessment and the time available to review it, I am able to consider only a few examples of other specific problems with the Assessment. I have focused on those that have to do with biological factors. These, however, are representative of problems throughout the Assessment. (Once again, the material in italics is quotes from the Assessment; the material in standard font is my text.)

Cores from corals, ocean sediments, ice records, and other indirect temperature measurements indicate the recent rapid increase of ocean temperature is the greatest that has occurred in at least the past millennium and can only be reproduced by climate models with the inclusion of human-caused sources of heat-trapping gas emissions (p. 559). As we saw earlier, the climate models are not coming even close to forecasting air temperature change, and therefore could not be expected to forecast accurately changes in ocean temperature, so it is not correct to say that something "can only be reproduced by climate models with the inclusion of human-caused sources of heat-trapping gas emissions."

Warmer air and ocean temperatures are also causing the continued, dramatic decline in Arctic sea ice during the summer (panel D) (p. 560). We published a paper comparing Arctic sea ice extent in the nineteenth century, using historical records from ships hunting the bowhead whale, with those in recent times.¹⁰ In this paper we wrote, "Records from May indicate that end-of-winter sea-ice extent in the Bering Sea during the mid-19th century closely resembled that in the 1972–82 data. However, the historical data reveal that sea ice was more extensive during summer, with the greatest difference occurring in July. This pattern indicates a later and more rapid seasonal retreat." While the statement in the White House Climate Change Assessment is not contradicted by our paper, the limited statement (about the summer) in the Assessment once again paints a dire picture to the average reader, whereas our work suggests that in fact the sea ice extent recovered over winter, and changes in arctic sea ice are more complicated than the Assessment implies. The problem here is a matter of tone and communication.

Key Message 4: Seasonal Patterns: Timing of critical biological events—such as spring bud burst, emergence from overwintering, and the start of migrations—has shifted, leading to important impacts on species and habitats (p.201). The implication here is that this is entirely negative for life on Earth and will forever be so. But on the contrary, the environment has always changed and is always changing, and living things have had to adapt to these changes.

Interestingly, many, if not most, species that I have worked on or otherwise know about require environmental change, including salmon and sequoia trees.^{11 12}

Two of the longest studies of animals and plants in Great Britain show that at least some species are adjusting to recent weather changes in “timing of critical biological events, such as spring bud burst, emergence from overwintering.” For example, a 47-year study of the bird *Parus major* (one of the longest monitoring of any bird species) shows that these birds are responding behaviorally to recent weather changes. A species of caterpillar that is one of the main foods of this bird during egg-laying has been emerging earlier as spring temperatures have risen. In response, females of this bird species are laying their eggs an average of two weeks earlier.¹³

The second study, one of the longest experiments about how vegetation responds to temperature and rainfall, shows that long-lived small grasses and sedges are highly resistant to climate change. The authors of the study report that changes in temperature and rainfall during the past 13 years “have had little effect on vegetation structure and physiognomy.”¹⁴

Of course with any environmental change, not all species will do well. This has always been the case, and is consistent with Darwinian evolution and with ecological knowledge. Black guillemots (*Cepphus grylle*), birds that nest on Cooper Island, Alaska, illustrate that some species are having difficulties adjusting to climate change. (However, black guillemots in their entire range are not a threatened or endangered species. It is only their abundance on Cooper Island that has declined.)

The problem has been that temperature increases in the 1990s caused the sea ice to recede farther from the island each spring. The parent birds feed on Arctic cod found under the sea ice and must then return to the nest to feed their chicks, who are not yet mature enough to survive on their own. For the parents to do this, the distance from feeding grounds to nest must be less than about 30 km, but in recent years the ice in the spring has been receding as much as 500–800 km (300–500 mi) from the island. As a result, the black guillemots on the island have lost an important source of food. The birds have sometimes targeted sculpin, which is not as abundant as cod.¹⁵

But the real problem these Cooper Island birds face today is egg predation by polar bears. With less sea ice during this time period, bears have gone ashore and eaten young birds. In 2009, of the 180 guillemots that hatched, only one on the island fledged (flew away). The solution to this has been to build bear-proof nesting boxes for the birds. In 2010, bear-proof nesting boxes resulted in about 100 birds that fledged.

Two points emerge here. One is that living things do in fact often adjust to changes in the timing of climate events; if not, there would be little or no life on Earth. The second is that the real problem black guillemots face is here-and-now predation, which can be and has been dealt with and does not require a single focus on whether or not the climate change was human-induced.

Chapter 7, *Forests*, opens with this:

Key Messages

1. Climate change is increasing the vulnerability of many forests to ecosystem changes and tree mortality through fire, insect infestations, drought, and disease outbreaks.

As I noted before, the Assessment suffers from the use of the term “climate change” with two meanings: natural and human-induced. The implication in this key message is that the forest problems are the result of human-induced climate change, but as I have made clear, both the

failure of the models and the failure of temperature change to closely track CO₂ make this key statement false. Furthermore, it is well known that (1) forest wildfires are largely due to long-term suppression of fires in the twentieth century, which allowed the buildup of excessive fuel; and (2) that insect infestations and disease outbreaks are heavily the result of introduced species and the failure to remove dead and decaying timber from forests. In addition, this key statement is another example where recent weather patterns are said to represent and prove human-induced global warming, which I pointed out at the beginning is incorrect.

Key Message 2. *U.S. forests and associated wood products currently absorb and store the equivalent of about 16% of all carbon dioxide (CO₂) emitted by fossil fuel burning in the U.S. each year. Climate change, combined with current societal trends in land use and forest management, is projected to reduce this rate of forest CO₂ uptake.*

As explained in my review of the IPCC 2014 report, the estimates of carbon uptake by vegetation used by IPCC and in major articles cited by the reports are based on what can best be called “grab samples,” a relatively small number of studies done at a variety of times using a variety of methods, mainly in old-growth areas. The results reported by IPCC overestimate carbon storage and uptake by as much as 300%.¹⁶ Therefore this is an unreliable statement.

As I stated at above, these are representative examples of problems that exist throughout the Climate Change Assessment.

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“CLIMATE CHANGE: THE NEED TO ACT NOW”
SENATE COMMITTEE ON ENVIRONMENT & PUBLIC WORKS
SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY
JUNE 18, 2014

Testimony of Alabama Attorney General Luther Strange

Good morning, Chairwoman Boxer, Ranking Member Vitter, Subcommittee Chairman Whitehouse, Ranking Member Sessions, and Members of the Committee. Thank you inviting me to testify here today. My name is Luther Strange, and I am the Attorney General of Alabama. As Attorney General, my sworn duty is to uphold the rule of law for the 4.8 million hardworking men and women in my state. That duty includes enforcing the environmental laws which help protect our natural resources and the health of our citizens. My comments today reflect a continuing concern with this Administration’s approach to environmental regulation. EPA’s proposed guidelines for existing power plant performance standards under Clean Air Act section 111(d) are simply the most recent example of the Federal Government usurping authorities properly delegated to the States.

Like electric suppliers all over the country, municipalities, cooperatives and investor-owned utilities in Alabama are trying to come to grips with what this proposal will mean to families and businesses in my state. Ultimately, someone has to pay for changing the way we produce and use energy. If anyone suggests that these costs are minimal or worth it because of the example that the United States will set, I would point out that setting an example in this instance cannot by definition be free or cheap. On its face, the Administration’s proposal would force electric suppliers to: 1) spend more for efficiency projects that are not economic, 2) deploy renewable energy projects that do not meet normal cost-benefit standards, 3) limit the amount of electricity used by customers through demand management efforts that do not meet standard cost tests, 4) operate gas plants out of economic order in a way that was never envisioned before the proposal, and 5) deny consumers access to lower cost coal plants—that were paid for through current low rates—in ways that no one ever envisioned before the proposal.

The proposal goes to great lengths to disguise or minimize the negative economic, social, and reliability impacts that it will have. Even the Administration’s own estimates, however, are shocking—65,000 megawatts of generation will be closed prematurely; 6,000 megawatts will close in my region; annual compliance costs will be between \$7.5 billion and \$9 billion and rising; southern region electric prices will increase by 3.4 percent by 2020 and nationwide by 6.5 percent. Recent history, moreover, has shown that EPA is likely to have underestimated these already severe impacts. During the MATS rulemaking, for instance, EPA told the nation that only 5,000 megawatts of coal-fired electric generation would be retired. Ten times that amount has been announced—some 50,000 megawatts. To put this in perspective, between the MATS actual impact and EPA’s low ball assessment of this proposal, America will shutter generation resources that exceed the electricity output of the entire nation of Spain. Early forced closure of existing generation has to have cost impacts—low-cost generation is closed, more costly generation remains, and customers must pay more for electricity. The result is inescapable and intended. Even the President acknowledged that electricity prices must “skyrocket” in order to implement his climate policies. I believe the President. I disagree with his policies.

The defense of this proposal will be that the States have “flexibility,” but providing the States with a narrow range of costly policy choices, which most of the States did not choose for themselves, does not provide any actual flexibility and still produces the same outcome—higher electricity prices and decreased generation. Repeating over and over the word “flexibility” is not an adequate defense or adequate answer to the low-income consumers in my state, or any other state, who will ask why they must pay more to reduce CO₂ emissions when those reductions cannot and will not impact the global climate.

In reaching this conclusion, I have given the President’s proposal the benefit of its own analysis. The U.S. Chamber of Commerce, however, may be closer to the mark when it predicted that the compliance costs for these regulations will be nearly \$480 billion by 2030, or \$28 billion a year by 2030. That is three times the EPA estimates. Electricity is a force multiplier, rising electric costs damage Gross Domestic Product. The Chamber says the loss will be \$50 billion a year, peaking at over \$100 billion in 2025. This would mean a typical family in my State would lose approximately \$3,400 in disposable income, which would affect poor families disproportionately. I am unwilling to transfer to a federal environmental agency the indirect, but undeniable, power to reshape my State’s energy portfolio and choices at the expense of the hardworking families of Alabama.

Congress did not intend for Clean Air Act section 111(d) to have such far-reaching consequences for the American people. Indeed, to prevent impacts such as those that will flow from EPA’s proposed emission guidelines, Congress took care to limit EPA’s authority under section 111(d). Given the enormous burdens that would be imposed by EPA’s proposed guidelines, however, it may be obvious that EPA has simply disregarded the limits of the law. These limits, moreover, are not questionable or controversial; they are express and clear elements of the Clean Air Act. As I will explain, the Clean Air Act forbids regulating sources under section 111(d) if they are regulated under section 112 of the Act. Existing electric utility generating units are regulated under section 112. The Clean Air Act also forbids section 111(d) regulations that are based on emission reductions that cannot be achieved at individual facilities but that instead rely on reductions that require actions by an entire system, including facilities acting in tandem, state governments, and even electricity consumers. EPA’s proposed emission guidelines fully embrace a system-wide approach to regulation. EPA has also improperly attempted to limit section 111(d)’s express statutory delegation of authority to the States, and, in doing so, EPA’s proposal not only rejects state discretion under the Clean Air Act but jettisons decades of unquestioned precedent establishing state jurisdiction over electricity markets. For each of these reasons, EPA’s proposed emission guidelines must be stopped before they do lasting damage to the Clean Air Act, the States, and the Nation.

The Clean Air Act Prohibits Regulation of Electric Generating Units Under Section 111(d)

As a threshold matter, the Clean Air Act is abundantly clear that EPA has no authority to issue this proposal. As explained in a June 6, 2014 letter from West Virginia Attorney General

Patrick Morrissey to EPA Administrator Gina McCarthy,¹ section 111(d) expressly states that EPA is prohibited from regulating any air pollutant emitted from an existing source category that is regulated under section 112 of the Clean Air Act.² EPA has imposed extensive regulations on existing coal- and natural gas-fired power plants pursuant to section 112, thereby precluding regulation of these sources under section 111(d). EPA itself has conceded that “a literal reading” of section 111(d) prohibits its proposed 111(d) guidelines for existing electric generating units, but claims an ill-defined right to fundamentally reinterpret the statute.³ As a state Attorney General, I believe the law is what the law says, and I am troubled by EPA’s belief that it can “fill in the blanks” in a statute when there are no blanks to fill.

The Clean Air Act Does Not Allow 111(d) Standards That Apply “Beyond the Fence-line”

Even if EPA had the authority to issue this proposal, EPA’s proposed emission guidelines flout fundamental statutory requirements in section 111(d). At the most basic level, the Clean Air Act demands that any standards of performance issued by States pursuant to section 111(d)—and any emission guidelines that EPA issues to inform the development of state standards—represent emission limits reflecting “best system of emission reduction” (“BSER”) that has been adequately demonstrated for the existing source.⁴

Specifically, section 111(d) plainly states that the EPA Administrator is to establish a procedure, including emission guidelines, under which each State prepares and submits “a plan which establishes standards of performance *for any existing source* for any air pollutant.”⁵ Further, the Act defines “stationary source” as “any building, structure, facility, or installation which emits or may emit any air pollutant.”⁶ The clear import of these provisions is that 111(d) standards must be based on the emission reductions that individual sources can achieve by controlling their own emissions.

The U.S. Court of Appeals for the District of Columbia Circuit has confirmed that 111(d) standards must be emission control obligations that can be applied to “a single building, structure, facility, or installation—the unit prescribed in the statute” and that EPA cannot rewrite the Clean Air Act to apply a 111(d) standard to “a combination of such units.”⁷

Accordingly, a 111(d) standard of performance can only be based on emissions reductions that are demonstrated and achievable at individual emitting facilities—here, CO₂ reductions that can be achieved at existing coal- and natural gas-fired electric generating units. In other words, a standard of performance must be based on emission reductions “inside the

¹ Letter from Hon. Patrick Morrissey, Attorney General of the State of West Virginia to Hon. Gina McCarthy, Administrator, U.S. Environmental Protection Agency, Re: EPA’s Asserted Authority Under Section 111(d) Of The Clean Air Act To Regulate CO₂ Emissions From Existing Coal-Fired Power Plants (June 6, 2014).

² Clean Air Act § 111(d)(1)(A)(i).

³ Legal Memorandum for Proposed Carbon Pollution Emission Guidelines for Existing Electric Utility Generating Units at 26.

⁴ Clean Air Act § 111(a)(1).

⁵ Clean Air Act § 111(d)(1) (emphasis added).

⁶ Clean Air Act § 111(a)(3).

⁷ *ASARCO v. EPA*, 578 F.2d 319, 327-328 (D.C. Cir. 1978).

fence-line” of a facility. EPA’s proposed 111(d) guidelines are based on reductions achievable “beyond the fence-line” and are, therefore, inconsistent with the Clean Air Act.

EPA has proposed to conclude that four “building blocks” of measures are the “best system of emission reduction” for controlling CO₂ at existing electric generating units. Those four categories, which EPA calls “building blocks,” are:

- (1) Efficiency requirements at coal and natural gas fired electric generating units;
- (2) Substituting generation from the most carbon intensive electric generating units with generation from less carbon intensive units;
- (3) Substituting generating from coal and natural gas-fired electric generating units with generation from zero-carbon renewable generation; and
- (4) Using demand-side efficiency measures to reduce the total amount of generation that its needed by consumers.

Building blocks 2, 3, and 4 all depend on CO₂ emission reductions that can only be achieved when multiple facilities are operated as a coordinated system. CO₂ emission reductions would be achieved under these building blocks, for instance, though emission averaging, allowance trading, demand-side reductions, and re-dispatching generation from one facility to another. This approach would effectively regulate the entire category of existing electric generating units as a single source and base the “standards of performance” on the emission reductions that arguably might be achievable by the category as a whole, rather than basing standards on reductions demonstrated and achievable at individual sources. This “beyond the fence-line” approach to setting 111(d) standards is inconsistent with the Clean Air Act and is in direct violation of D.C. Circuit’s holding in *ASARCO v. EPA*.

Further, even building block 1—imposing efficiency improvement requirements at coal- and natural gas-fired electric generating units—violates Clean Air Act requirements. The Clean Air Act requires that “standards of performance” be “achievable” on a continuous basis by the facilities regulated under section 111(d). Standards of performance for existing electric generators based on one-size-fits-all efficiency improvements cannot be “achievable.” The results possible at individual sources differ wildly: some units may be able to achieve meaningful efficiency gains; others that are already highly efficient will not be able to further enhance their efficiency. Even at individual sources, measures to improve efficiency often degrade over time, so that the source may not be able to demonstrate the same emission levels continuously. Moreover, the emission impacts of efficiency improvements are exceedingly difficult to measure, and if a source is used to its full capacity, there will by definition be no absolute reduction in emissions. Thus, it is not feasible or consistent with the Clean Air Act to prescribe or enforce a “standard of performance” based on efficiency improvements for existing electric generating units.

Additionally, undertaking efficiency improvements at a power plant could potentially incite other regulatory requirements. In the past, EPA and environmental groups have filed lawsuits alleging that power plant efficiency improvements triggered additional obligations under the Act's onerous "New Source Review" program. The potential for additional liability will have a chilling effect, reducing the availability of compliance options.⁸

EPA's building block approach to establishing 111(d) guidelines is not only unlawful, it is inscrutable and onerous. EPA has an obligation to promulgate its guidelines through an open and transparent process. Unfortunately, EPA has failed to meet that obligation, as this complicated building block analysis results in complex calculations based on unfounded technical assumptions that are not adequately explained anywhere in the record. Although my staff and I are still in the process of unpacking this byzantine analysis, even a cursory review of the measures required to meet my state's emissions target is shocking. According to EPA's model, by 2030 Alabama would need to eliminate over 20% of its affordable and reliable coal-fired generation; increase generation from more intermittent renewable energy sources over five-fold; and expand nuclear generation by over 2.3 million megawatt-hours. These draconian requirements, built on such a flimsy legal foundation, are a grave abuse of regulatory authority.

The Proposed 111(d) Guidelines Unlawfully Disregard State Authority

The proposed 111(d) guidelines' substantive shortcomings are compounded by significant procedural failures that undermine the role of the States under the Clean Air Act. However, as noted in an analysis sent to EPA from a bipartisan group of 17 Attorneys General, including myself, the proposal would, in fact, upend the Act's deliberate division of regulatory authority between the States and the Federal Government.⁹

At its heart, the Act relies on the principle of "cooperative federalism" and establishes clearly defined roles for both EPA and the States that recognize that "air pollution control at its source is the primary responsibility of States and local governments."¹⁰ Cooperative federalism embodies the values enshrined in the Tenth Amendment to the U.S. Constitution, which declares that those powers "not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people." It also reflects the inherent wisdom of entrusting authority to the level of government that is closest to regulated sources, is most familiar with local operating conditions, and is most sensitive to local costs and impacts to consumers and businesses. Yet EPA's proposed emission guidelines depart radically from this fundamental principle and, if finalized, would expand EPA's authority far beyond the bounds of the Clean Air Act.

Section 111(d) unambiguously grants States the sole authority to decide what standards will apply to existing sources and only provides a limited role for EPA – a role the Agency has

⁸ See Pennsylvania Department of Environmental Protection, *Recommended Framework for the Section 111(d) Emissions Guidelines Addressing Carbon Dioxide Standards for Existing Fossil Fuel-Fired Power Plants*, Apr. 10, 2014.

⁹ *Perspective of 18 States on Greenhouse Gas Emission Performance Standards for Existing Sources under § 111(d) of the Clean Air Act*, Sep. 11, 2013.

¹⁰ Clean Air Act § 101(a)(3).

plainly overstepped here. The Act merely authorizes EPA to “establish a *procedure*” for States to submit plans establishing standards of performance for existing sources.¹¹ Clearly, EPA’s role in regulating existing sources is purely procedural: the Agency has no authority to establish the substantive requirements to be imposed. It is States that establish the applicable emission standards. EPA’s implementing regulations allow the Agency to promulgate an “emission guideline” setting forth “criteria for judging the adequacy” of state plans, but these guidelines do not impose any substantive obligations on States or existing sources.¹²

Section 111(d) requires that the procedure for submitting these state plans must be similar to section 110’s procedure for submitting state implementation plans, or “SIPs,” implementing the National Ambient Air Quality Standards. It is important that Congress used this analogy, because it highlights the substantial discretion States can exercise in designing their plans for existing sources and EPA’s limited ability to second-guess that discretion. Nearly 40 years ago, the U.S. Supreme Court held in *Union Electric Co. v. EPA* that the Agency *must* approve a SIP if the State has accounted for all of the relevant statutory requirements, even if EPA disagrees with the State’s choice of emission limits.¹³ More recently, the Fifth Circuit repeated that “the Act confines the EPA to the ministerial function of reviewing SIPs for consistency with the Act’s requirements.”¹⁴

In that vein, section 111(d) limits EPA to the “ministerial function” of approving state plans for existing sources as long as the State has considered the appropriate statutory requirements—in this case, the factors listed in section 111(a)(1) to set its “standards of performance.” That provision states that standards of performance must be “achievable” for individual sources through the application of the “best system of emission reduction” that has been adequately demonstrated, and must account for costs, energy requirements, and other environmental impacts.¹⁵ Under 111(d), it is the States—not EPA—that are authorized to establish emission standards; therefore it is the States—and not EPA—that weigh these statutory factors to determine what standard is appropriate for existing sources. As with the SIPs, EPA cannot use its emission guidelines to dictate the substance of the standards in state plans; it can only require that States adopt performance standards that are based on the application of the statutory factors.

EPA’s proposed emission guidelines for greenhouse gases bear no resemblance to the CAA’s legal framework or to any of EPA’s previous 111(d) rulemakings. Instead of recognizing State authority and expertise, EPA has relegated States to implementing a federal mandate handed down from Washington, regardless of its costs, effectiveness, or achievability in light of local circumstances. Despite the Agency’s numerous public claims to have incorporated “flexibility” into its unprecedented approach, EPA’s proposal actually *denies* States the flexibility that section 111(d) mandates and that the States have historically exercised.

¹¹ Clean Air Act § 111(d)(1) (emphasis added).

¹² 40 C.F.R. § 60.22(b)(5); 40 Fed. Reg. 53,341 (Nov. 17, 1975).

¹³ 427 U.S. 246 (1976).

¹⁴ *Luminant Generation Co., LLC v. EPA*, 675 F.3d 917, 921 (5th Cir. 2012).

¹⁵ Clean Air Act §111(a)(1).

For example, the Clean Air Act explicitly allows States to consider “the remaining useful life” and “other factors” within the State’s discretion in order to tailor standards to individual sources.¹⁶ Likewise, States are free to determine that a specific source or group of sources should be subject to a less stringent standard or longer compliance schedule because of costs, physical limitations on installing control equipment, or any other factor making a less stringent standard more reasonable.¹⁷

But under the proposed emission guidelines, EPA is attempting to strip that discretion from the States. The Agency makes clear that under its approach, any State plan that does not match the target emission rate chosen by EPA will be rejected. And because the target rates rely on the exercise of all the State’s tools, no discretion remains. Putting aside the lack of any language in the Clean Air Act authorizing EPA to establish mandatory emission guidelines, by proposing a single state-wide emission rate for existing sources, the Agency is eliminating States’ inherent ability to adjust their plans to account for costs, achievability, aging sources, or any of the other myriad factors a state may rely on to perform its statutory role of establishing emission standards. Each State’s proposed target subsumes all existing sources under one emission rate, preventing any meaningful sub-categorization or individualization of standards: a State cannot reduce the burden on one source (as section 111(d) allows it to do) without increasing the burden on others. Given that EPA’s proposed targets appear to be unachievably high at the outset, depriving States of their ability to account for local impacts will only exacerbate the destructive consequences of EPA’s guidelines for consumers and for the economy. EPA should abandon its attempt to usurp the role of the States.

The Proposed 111(d) Guidelines Would Displace Traditional State Control of Electricity Markets

The proposed 111(d) guidelines also undermine State roles in policy areas well outside the Clean Air Act. For nearly a century, States have enjoyed substantial flexibility to oversee the generation and distribution of electricity within their borders. This autonomy flows from the Federal Power Act’s recognition that State and federal authorities occupy distinct and separate spheres with regard to the regulation of electricity. Specifically, the Federal Power Act broadly limits federal regulations “only to those matters which are not subject to regulation by the States.” Thus, the Federal Government may exercise jurisdiction over the transmission of electricity in interstate commerce, as well as wholesale sales of electricity in interstate commerce.¹⁸ As recently as last month, the U.S. Court of Appeals for the District of Columbia Circuit reaffirmed that, absent a “clear and specific grant of jurisdiction,” the Federal Government cannot regulate areas of the electricity market left by the Federal Power Act to the States.¹⁹

¹⁶ Clean Air Act § 111(d)(1)(B).

¹⁷ 40 C.F.R. § 60.24(f).

¹⁸ 16 U.S.C. § 824(a) and (b). Consistent with the scope of this express statutory authorization, it has been recognized that the Federal Power Act permits regulation of unbundled sales of transmission in a state, even when such sales are at retail. *See New York v. FERC*, 535 U.S. 1 (2002).

¹⁹ *Electric Power Supply Association v. FERC*, No. 11-1486 at 9 (D.C. Cir. May 23, 2014).

EPA claims its outside the fence-line approach offers States flexible options to implement the proposed 111(d) guidelines. What EPA calls “flexibilities”—changing dispatch rules, mandating efficiency, utilizing other generation sources—are, in fact, the very intrastate generation, transmission, and distribution matters explicitly reserved by the Federal Power Act for the States. By requiring States to meet standards based on these outside the fence-line actions, the 111(d) guidelines effectively upend the Federal Power Act’s careful balance between State and federal authority, subverting traditional State control of retail electricity matters with a federal mandate to overhaul virtually every aspect of the intrastate electricity system. Thus, the proposed 111(d) guidelines effectively replace the Federal Power Act’s co-regulatory model with federal regulations, in EPA’s own words, “from plant to plug”²⁰—granting the Federal Government powers denied it for nearly the entire history of the electricity grid. Since 1915, the Alabama Public Service Commission has guided intrastate electricity development so as to protect rate-payers and ensure reliability. Under EPA’s proposed 111(d) guidelines, however, the Commission could continue these efforts only in so much as they comport with EPA’s greenhouse gas agenda.

Congress surely did not intend to undermine the entire Federal Power Act structure by authorizing such expansive powers under the Clean Air Act—particularly under section 111(d), where, as explained above, State and federal powers are so carefully tailored. Rather, this provision can only be coherently read, both internally and externally, as contemplating measures solely inside the fence-line of a designated facility. Indeed, while the proposed 111(d) guidelines quote analysis questioning whether the division between inside and outside the fence-line measures “arguably becomes irrelevant—at least from a legal perspective[,]”²¹ the Federal Power Act’s express limitations make clear that this distinction is not without cause. By limiting 111(d) to only those measures inside the fence-line of a designated facility, Congress constrained EPA to the role of environmental protection and prevented the Agency from impinging on outside policy matters like traditional electricity regulation. Ultimately, limits on federal power in both the Federal Power Act and Clean Air Act section 111(d) are not legally irrelevant, but instead reflect Congressional assent to the Tenth Amendment’s exhortation that “the powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.”

Conclusion

The State of Alabama vigorously opposes EPA’s proposed mandate to effectively restructure the electric sector, as it would have disastrous consequences for electric reliability and the economy. Those consequences, moreover, would all stem from a patently unlawful application of the Clean Air Act. EPA’s proposal seeks to expand the scope of section 111(d) in an unprecedented manner. It would do so at the expense of State authority that is expressly identified and preserved in the Clean Air Act and in the unquestionable jurisdiction of States over intrastate electricity markets. And it would do all of these things for no discernible benefit, given the increasing emissions of China and other developing economies. There is no rationale that can support such a regulation, and this Committee should ensure that it is halted.

²⁰ EPA Administrator Gina McCarthy, *Remarks Announcing Clean Power Plan, As Prepared*, June 2, 2014.

²¹ Proposed 111(d) Guidelines at 312-313, FN 237.

Testimony of Joseph R. Mason

Hermann Moyse, Jr./Louisiana Bankers Association Professor of Finance,
Louisiana State University and Senior Fellow, The Wharton School

Before the United States Senate
Environment and Public Works Committee
Subcommittee on Clean Air and Nuclear Safety

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"Climate Change: The Need to Act Now."

Table of Contents

I.	The Price of Carbon on Cap and Trade Markets Has Not Achieved Levels to Restrain Output.....	1
II.	Announcing a Quantity Target is No Different.....	3
III.	Any effective program WILL restrain economic growth.....	3
A.	The effects of carbon goals will be uneven.....	3
B.	The unevenness of the EPA’s goals will affect state-level jobs and growth.....	5
C.	Economic effects will hit consumers, as well	6
IV.	...but if it doesn’t also restrain carbon, it is all pain and no gain.....	6
A.	Governments don’t have the appetite for restraining economic growth (that’s why we have independent central banks)	6
B.	Arguments abound over who decides the supply of permits, and this new Federal layer will intensify those in the US	8
C.	There is no appetite for using proceeds of carbon permit sales to invest in new technology	9
V.	Worse yet, if carbon markets just benefit Wall Street then they just create new interest groups to capture the government and the financial markets.....	10
A.	Investor Fraud	10
B.	Corporate Fraud	13
C.	Permit Fraud.....	14
1.	Counterfeiting	14
2.	Theft.....	15
VI.	Conclusion and Policy Recommendations.....	16

The US government is once again pursuing cap and trade mechanisms. As an economist, I have to say I have no idea why.

Since I am not a climate scientist I cannot opine from more than a lay perspective on whether there is a consensus in the discipline on man-made global warming. Since I am an economist, however, I can say that there exists a wholesale consensus among economists that carbon is not well-suited for cap and trade.

Moreover, existing markets in the US and EU have failed to price carbon at levels that lead to reduced carbon emissions because to do so would be costly to economic growth. The question of “who can issue the permits” continues to drag down the effectiveness of the EU system, and poses considerable problems for the proposed state-level system in the US. There is no plan for investing the proceeds from permit sales in developing clean technology. And existing carbon markets have been prone to fraud, theft, and counterfeiting worldwide. All of this is widely reported and known throughout the world. Jumping in with our eyes closed to such crucial developments exposes US citizens and the US, and world, economies to unnecessary risk.

Below, I review recent evidence on the shortcomings of cap and trade, concluding that we should emulate the historical approach we took to establishing a central bank after the Panic of 1907: take our time and study what works and what does not so that we design an effective system that does not pose unnecessary costs upon our nation.

I. The Price of Carbon on Cap and Trade Markets Has Not Achieved Levels to Restrain Output

Cap and trade does not work for carbon. The reasons for that failure are multi-faceted, but the simple fact is that even existing markets have not priced carbon at levels that restrain output for many years now.

The ETS has suffered from a drastic oversupply of carbon permits for quite some time. In October 2009, Peter Zapfel, assistant to the deputy director general of the environment department at the European Commission, said the oversupply of government allowances is threatening to overwhelm the system. At the time, many newer EU members from Central and Eastern Europe contributed a huge oversupply of credits. These countries have excess credits that numbered roughly five times the number in European market, depressing prices and undermining carbon reduction goals the market was formed to support.¹

Since then, little has changed. In fact, by January 2013, record low auction bids from utilities, factories and banks led Germany to cancel an auction of European Union emission permits for the first time, ever. Connie Hedegaard, the EU’s climate chief, said the cancellation should be a “wake-up call” for those who do not support the plan to strengthen the emissions trading

¹ Financial Times (USA); Date: Dec 7, 2009; Section: Investing in commodities; Page: SR7-6.

system.² At the close of trading on Friday, June 13, 2014, EU carbon was trading at 5.71 euro, far short of the 20-euro level needed to prompt industry and utilities to invest in greener energy.³

The US is following a similar path by emulating the EU system instead of learning from its problems. Currently there are two markets in US: one in California (California Air Resources Board) and the nine-state Regional Greenhouse Gas Initiative (RGGI) in Northeast. Neither prices carbon at levels that restrict carbon emissions.

Most recently, it was reported that California companies bought all 16.95 million allowances to release carbon emissions at the state's May 16, 2014 cap-and-trade auction. The price for the carbon allowances was \$11.50 each, slightly higher than the previous two auctions in February and November, each of which sold allowances for \$11.48 each. An additional 4 million permits that can't be used until 2017, of the 9.2 million that were available, sold at \$11.36.

Analysts at Thompson Reuters Point Carbon expect prices to hover just above the program's auction floor price of \$11.34 a metric ton through 2014. Earlier this year, analysts predicted California carbon prices would remain low through 2020 due to excess permits.⁴

"The price for power plants to emit one ton of carbon dioxide in nine northeastern U.S. states cleared at a record high \$5.02 per short ton at the Regional Greenhouse Gas Initiative's (RGGI) 23rd permit auction," the market's administrator said on Friday, June 6, 2014.⁵

The sad fact for politicians is that markets are doing exactly what we economists expect them to do. There is virtually no disagreement among economists that the true cost to society of burning a ton of carbon is greater than its private cost. However, "agreeing that the [social cost of carbon] is greater than zero isn't really agreeing on very much."⁶ The market, in fact, is pricing the most likely environmental scenarios, for which temperature increases are moderate and effects are small, putting carbon in roughly the \$10 to \$40 range.

But that is precisely what markets do. Markets price the "expected" value. If we want to prices to reflect more dramatic outcomes we will have to use a carbon tax. In short, just like in the recent financial crisis, markets are doing what they are supposed to do. Back then, politicians did not like the fact that markets were telling us that a meltdown was coming. Here, politicians do not like the fact that markets pricing the most likely (but not most destructive) scenarios, and they

² EU Carbon Permits Plunge to Record after Germany Cancels Sale," Bloomberg News, Jan 18, 2013. <http://www.bloomberg.com/news/2013-01-18/eu-carbon-plunges-after-german-sale-canceled-on-low-bid-prices.html>.

³ Garside, Ben. Reuters. European Parliament votes to cut carbon permit supply. December 10, 2013. <http://uk.reuters.com/article/2013/12/10/eu-parliament-carbon-idUKL6N0JP2AT20131210>.

⁴ "California Carbon Auction Sells All Allowances," Environmental Leader, May 23, 2014 at <http://www.environmentalleader.com/2014/05/23/california-carbon-auction-sells-all-allowances/>

⁵ Northeast pollution permit prices rocket, boosted by EPA, Reuters, June 6, 2014.

⁶ Pinkdyck, Robert. "Pricing Carbon When We Don't Know the Right Price." Regulation. Summer 2013 at <http://web.mit.edu/rpinkdyck/www/Papers/PricingCarbonRegulation2013.pdf>.

will not do anything else. Either way, markets are telling us the unvarnished truth, whether we like it or not.

II. Announcing a Quantity Target is No Different

One of the hallmarks of the EPA's recent proposal is to establish carbon intensity goals, in effect setting quantity targets rather than price targets that have been the focus of prior carbon abatement mechanisms.

To a monetary economist, however, a quantity target is just the flip side of a price target. Through the history of modern central banking, the US Federal Reserve has experimented with both. For certain periods of time, the Federal Reserve used quantity targets (i.e., M1) and for others, price targets (i.e., the Fed Funds rate). There is no clear evidence that one is superior to the other. In fact, in some periods of history quantities worked fine, while in other prices were superior. Thus, it will be an economic question whether price or quantity is a better target.

It is unclear whether the quantities set are correct, meaningful, or achievable. If they are incorrect, they will be so because they either have no effect on carbon output or they are economically unachievable. If they are unachievable, they will be challenged by the relevant states and, most likely, altered.

The possibility of alteration by Congressional or administrative fiat, however, is precisely the political risk that has contributed price volatility to the EU system. Critics complain that carbon price volatility and the market's exposure to political risk mean the system does not encourage companies to invest in emission reduction, because the goals may be ultimately changed (or firms can lobby for change).⁷

III. Any effective program WILL restrain economic growth

But to begin with, we will first have to set some truly restrictive targets. It is doubtful, however, that meaningfully restrictive targets will arise from Congressional or administrative fiat because elected officials do not like to restrain growth, such decisions will force them to pick winners and losers, and states, industries, and even groups of consumers will have to be chosen.

A. The effects of carbon goals will be uneven

Widespread press coverage already noted the disparity of the goals across states. The Financial Times' Ed Crooks immediately noted that the states with the most demanding targets included

⁷ Financial Times (USA); Date: Dec 7, 2009; Section: Investing in commodities; Page: SR7-6.

Arizona, South Carolina, Oregon, and New Hampshire, while states with least demanding targets included Maine, Rhode Island, Hawaii, and Iowa.⁸

Moreover, Crooks noted that there was perhaps a tenuous connection between goals and actual carbon dioxide states will emit.⁹ Bloomberg Energy Finance reported that California, Nebraska, Rhode Island can actually increase volume of emissions in absolute terms. Louisiana, Arkansas, Idaho will face the largest cuts.¹⁰

*In its ground-breaking “Clean Power Plan” released 2 June, the US Environmental Protection Agency (EPA) proposed to work with 49 states to slash the CO2 intensity of fossil-fuel power generation by 2030. The headlines were simple enough: US plans to cut its emissions 30% from 2005 levels. But **what the regulation actually does is lay out a series of (convoluted) state-level targets designed to reduce the carbon intensity of states’ power.***¹¹

Heightening the probability of political risk and disruptive volatility, “President Barack Obama’s plan to cut power plants’ carbon dioxide emissions places a widely differing burden on different states, opening the proposals to objections from those that feel they are being treated unfairly.” Jacob Hollinger, a former EPA lawyer who is now a partner at McDermott, Will & Emery, was quoted as saying he was “‘surprised’ by the differences in the demands made of different states. ‘The implications aren’t totally developed yet, and that is something people should be scrutinising very carefully,’” he said.¹²

My own analysis suggests that the differences in goals among states are also related to politics. In preparing for this hearing, I regressed the goals multiplied by each states’ percent of power from coal in 2013¹³ (to adjust the goals for existing carbon intensity) on each states’ GSP and employment change from 2007 to the most recent quarter, as well as variables related to the Democrat’s “political productivity” of each state in the 2012 elections.¹⁴

⁸ Crooks, Ed. “States feel unequal burden of carbon reduction targets.” Financial Times, June 3, 2014. <http://www.ft.com/intl/cms/s/2/0ea7fe8e-eb32-11e3-bab6-00144feabdc0.html#axzz34L33dgID>

⁹ Ibid.

¹⁰ “EPA’s Clean Power Plan: 50 Chefs Stir the Pot,” Bloomberg New Energy Finance Jun 3, 2014 at <http://about.bnef.com/white-papers/epas-clean-power-plan-50-chefs-stirs-pot/>

¹¹ Ibid. [Emphasis added.]

¹² Crooks, Ed. “States feel unequal burden of carbon reduction targets.” Financial Times, June 3, 2014. <http://www.ft.com/intl/cms/s/2/0ea7fe8e-eb32-11e3-bab6-00144feabdc0.html#axzz34L33dgID>

¹³ The range of the dependent variable is -0.96 to +0.35, since some states are allowed to increase, overall.

¹⁴ The theory of political productivity starts with the notion that a state that cannot be won regardless of what favoritism is directed their way is not worth pursuing, as is one that the party knows they will win regardless of what favoritism is directed their way. Thus, swing states are the ones that parties favor, because grants or programs benefitting those states can have the most “productivity” in elections. The method has been applied to examining the distribution of Federal grants and expenditures from the Great Depression to today.

The regression shows that the EPA's goals are inversely related to GSP growth between 2007 and the most recent quarter (in other words, states with higher change in GSP from 2007 to the most recent quarter *less* restrictive goals, punishing states with lagging economies coming out of the recession) and the effect is statistically significant. The EPA's (normalized) goals are positively related to unemployment (states with less of a recovery in unemployment since 2007 have less restrictive goals to meet), though the effect statistically *insignificant* at conventional levels. Political productivity for the Democratic Party, however, is positive and statistically significant suggesting the EPA's goals would have benefitted the Democrats in the past presidential election. Assuming 2016 is similar, the distribution of EPA goals among states will benefit them then, too.

B. The unevenness of the EPA's goals will affect state-level jobs and growth

It has been clear from applications, worldwide, that companies that do business in regions in which carbon is priced will build carbon costs into their investment and planning decisions. For instance, Shell Vice President Angus Gillespie has stated publicly that climate policies can cost potential investment projects "hundreds of millions of dollars" and that "there are opportunities we have not progressed because of the \$40 a ton" carbon cost estimate that they use internally in their capital budgeting process.¹⁵

But it is not just energy companies that price carbon costs into their planned investments. At least twenty-eight US companies are known to report the carbon prices that they use for internal capital budgeting, including: Delphi Automotive, Walt Disney, ConAgra Foods, Walmart, Apache Corporation, BP, Chevron, ConocoPhillips, Devon Energy, ExxonMobil, Hess, Shell, Wells Fargo, Cummins, Delta Air Lines, General Electric, Google, Jabil Circuit, Microsoft, E.I du Pont de Nemours, Ameren, American Electrical Power, CMS Energy, Duke Energy, Entergy, Integrys Energy, PG&E and Xcel Energy.¹⁶

First, note the diversity of those companies, including energy firms like Exxon, consumer firms such as Walmart, and even entertainment firms like Disney. Clearly, carbon costs affect a broad swath of our economy.

But even more interesting is the diversity of carbon prices used by each of those firms. Prices range from \$10-\$20 at Disney to \$60 at Exxon, and a wide variety of prices in between. As previously stated, carbon price volatility has been an enduring feature of the EU market and political risk in the EU and the US continues to contribute to widely disparate views of the price of carbon in the future, as a result.

¹⁵ Climate Rules May Prompt Higher Shell Internal Carbon Price. June 2, 2014. <http://www.environmentalleader.com/2014/06/02/climate-rules-may-prompt-higher-shell-internal-carbon-price/>.

¹⁶ "Big Oil, Major Firms Plan for Carbon Price," Environmental Leader, December 5, 2013. <http://www.environmentalleader.com/2013/12/05/big-oil-major-firms-plan-for-carbon-price/>.

C. Economic effects will hit consumers, as well

The broad industry exposure to carbon prices illustrated above will undoubtedly affect consumers, not just in their utility bills but in all manner of expenditures. So far, the impact on utility bills is expected to be modest, but this expectation seems to be based on natural gas prices remaining low.

Further investment in renewables and other energy sources will undoubtedly push up consumer costs.

According to the International Energy Agency, global investment in the energy sector will need to reach \$38tn between 2011 and 2035, based on existing trends. Almost \$17tn of this will be for electrical power, covering generation, transmission and distribution. Citi analysts said in a report in September that, while renewables are forecast to make up 50 per cent of additional power output capacity by 2035, they will cost \$5.9tn, against \$3.9tn for conventional sources.¹⁷

One of the most radical transformations in electrical power is happening in Germany, “where the government has committed to phasing out nuclear power stations and switching to renewable energies within a decade.” But new installation of subsidized wind and solar is pushing up electricity prices for consumers. Guaranteed prices for electricity from renewable sources have encouraged investors to build new capacity. The higher prices, however, have come at the expense of consumers in the form of increased energy bills, in order to pay green energy generators an estimated €20.4bn in feed-in tariffs in 2013.¹⁸

As a result, in October 2013, the country’s grid operators raised the mandatory surcharge on units of electricity to a record 5.3 cents per kWh for 2014, up from 3.6 cents. “For a typical household using 3500 kWh per year, this surcharge would rise from €125 to €185. The move is all the more contentious as many businesses are exempted, to protect their international competitiveness.”¹⁹

IV. ...but if it doesn’t also restrain carbon, it is all pain and no gain...

A. Governments don’t have the appetite for restraining economic growth (that’s why we have independent central banks)

As a result of such obvious costs, no system has yet to restrain carbon permit issues to levels that meaningfully restrict carbon output. Even though Germany has come around to imposing costs of developing renewable energy sources on individual consumers, carbon prices are still too low

¹⁷ “Green agenda prompts pricing concerns,” Financial Times Special Report on Energy, November 5, 2012 at 2.

¹⁸ Ibid.

¹⁹ Ibid.

to restrict output. Thus, Germany's is a pure subsidy-driven plan, not a carbon market-driven plan.

Germany, in fact, cancelled an auction in January 2013 due to record low bids from utilities, factories and banks forced Germany to cancel a sale for the first time. Connie Hedegaard, the EU's climate chief said afterward, "the need to fix the market is getting urgent." Johannes Teysen, chief executive officer of EON SE, Germany's biggest power utility, said in an interview with *Manager Magazin* that the EU greenhouse gas trading system is now, "a joke the whole world laughs about." Matthew Gray, an analyst in London at Jefferies Group Inc., opined that some buyers will probably wait for prices to drop further and the commission has limited influence to contain the market's decline. The problem is, when the bloc set the program's cap before 2008, it didn't install a system for dealing with a supply glut.²⁰

In December 2013, EU Parliament finally voted to backload (delay) sales of 900 million carbon permits. Matthias Groote, the German Socialist lawmaker who steered the legislation through parliament, argued that, "backloading is not enough. The market is still oversupplied by 2 billion permits, but this buys us time to have a discussion on how to reform it." Still, the proposal caused "fierce divisions within member states, national governments and the European Parliament over fears it will push up energy prices and dent economic growth."²¹

As a result of the decision, the benchmark December 2013 EU Allowance futures ended the trading day at 4.90 euros. Assuming the first allowances will be withheld from the market in the second half of 2014, Marcus Ferdinand, an analyst at Thomson Reuters Point Carbon, "forecast the Dec-14 carbon price will increase by 35 percent compared to this year's (mean) price, to an average of 6 euros." Analysts predicted prices could eventually double due to backloading, but that it would still be years before they rise above the 20-euro level needed to prompt industry and utilities to invest in greener energy. Some EU lawmakers believe the bloc's carbon market will be irrelevant without further reform.²²

On the March 19, 2014, U.K. Chancellor of the Exchequer George Osborne announce the government would freeze a tax on carbon emissions starting in April 2016 as part of a broad plan to cut consumer energy bills. Consumer energy costs have become a campaign plank, with Prime Minister David Cameron's administration coming under pressure to rein in rising energy costs as a result of Ed Miliband, the leader of the opposition Labour Party, vowing in November to freeze energy prices if he wins the next election in mid-2015. That move prompted the government in

²⁰ EU Carbon Permits Plunge to Record after Germany Cancels Sale," Bloomberg News, Jan 18, 2013. <http://www.bloomberg.com/news/2013-01-18/eu-carbon-plunges-after-german-sale-canceled-on-low-bid-prices.html>.

²¹ Garside, Ben. Reuters. European Parliament votes to cut carbon permit supply. December 10, 2013. <http://uk.reuters.com/article/2013/12/10/eu-parliament-carbon-idUKL6N0JP2AT20131210>.

²² Ibid.

to announce measures cutting green levies by 50 pounds per household a year in December 2013.²³

As of Monday, June 16, 2014, “the use of carbon markets to curb rising greenhouse gas emissions was dealt a blow on Sunday after two weeks of United Nations talks on designing and reforming the mechanisms ended in deadlock.”²⁴

At the close of trading on June 13, 2014, the price was 5.71 euros.

B. Arguments abound over who decides the supply of permits, and this new Federal layer will intensify those in the US

Part of the problem in Europe has been jurisdiction over the issuance of carbon permits.

In 2007, the EU executive rejected Poland's national allocation plan (NAP), which set its total emission allocations and outlined how it intended to distribute them to individual factories covered by the scheme. The EU's main objection was that countries like Poland intended to allocate too many allowances.²⁵

In September 2009, the Commission's decision was overturned by the European Court of First Instance (the General Court). “The court found that member states alone can take the final decision on the total number of allowances to allocate, and ruled that the EU executive had misused its powers.” That decision also ruled on disagreements with Slovakia, the first country to take the issue to the court, and Estonia. All three countries argued that the EU's limits were too low and would hurt their economies.²⁶

In 2013, a Superior Court judge in California rejected a private legal challenge to California's carbon auctions. In that action, the California Chamber of Commerce and Pacific Legal Foundation, on behalf of a dozen clients including Morning Star Packing Company and Dalton Trucking, had filed lawsuits in Sacramento Superior Court to block the carbon allowances.²⁷ While I am not qualified to opine on the legal details, it seems to me that this ruling sets the framework for a similar problem to that of the EU member states where, regardless of the EPA's goals, states' rights to set permit levels may not be able to be challenged.

²³ Morales, Alex and Rachel Morison. Osbourne Freezes U.K. Carbon Tax on Power to Cut Bills. March 19, 2014. <http://www.bloomberg.com/news/2014-03-19/osborne-freezes-u-k-carbon-tax-on-power-to-cut-bills.html>.

²⁴ “U.N. climate talks fracture over future of carbon markets,” Reuters, June 16, 2014.

²⁵ EurActiv. EU, Poland move to settle carbon quota row. April 20, 2010. <http://www.euractiv.com/climate-environment/eu-poland-move-settle-carbon-quo-news-461636>.

²⁶ Ibid.

²⁷ “California Carbon Auction Sells All Allowances,” Environmental Leader, May 23, 2014 at <http://www.environmentalleader.com/2014/05/23/california-carbon-auction-sells-all-allowances/>.

C. There is no appetite for using proceeds of carbon permit sales to invest in new technology

Since carbon prices remain depressed, California's quarterly permit auctions will only raise \$21 billion for the period through 2020, well below the anticipated \$60 billion in revenue.²⁸

Sales have raised \$396 million for the state so far, and that money was initially intended to be devoted to efforts to lower greenhouse gas emissions by subsidizing renewables and new technologies. Instead, however, Governor Jerry Brown decided to, "lend \$500 million from the funds to the California state legislature to plug gaps in the state's budget," The state is supposed to repay the state-run greenhouse gas emissions reduction account at a later date.²⁹

Perhaps California can come around. The California Legislature announced Monday, June 16, 2014 that it had approved a \$108 billion spending plan for the 2014-15 fiscal year that included, "\$250 million for the High-Speed Rail project, along with 25 percent of future cap-and-trade funds.... Lawmakers also agreed to spend \$200 million using cap-and-trade revenue on low-carbon transportation projects and \$130 million on affordable housing projects near mass transit."³⁰ Of course, that budget is subject to approval by Governor Jerry Brown. But even if he approves, the on-again, off-again nature of green commitments in California will make it difficult for firms to commit to providing jobs and growth in that sector in the long-run.

Even devoting carbon permit revenues to mass transit, new technologies and renewables, however, has been derided as unjustifiable. "Those most vulnerable to climate change are often least responsible for its causes, and have the fewest resources to deal with its consequences."³¹

*The revenues could support vulnerable countries' efforts to develop long term plans to deal with climate change, as well as finance pilot projects aimed at minimizing loss and damage.... They could fund the monitoring and forecasting of slow-onset and extreme-weather events, enabling authorities and the public to prepare more effectively for an impending disaster. And the money could cover loss-and-damage risk premiums on individual, local, national, regional, or international insurance policies.*³²

²⁸ "California Carbon Auction Sells All Allowances," Environmental Leader, May 23, 2014 at <http://www.environmentalleader.com/2014/05/23/california-carbon-auction-sells-all-allowances/>.

²⁹ Carroll, Rory. California court upholds stat's right to sell carbon permits. November 14, 2013. <http://news.yahoo.com/california-court-upholds-states-sell-carbon-permits-234628252.html>.

³⁰ Gutierrez, Melody, "State lawmakers OK \$108 billion budget; plan moves to Gov. Brown," June 15, 2014, at <http://www.sfgate.com/news/article/California-Legislature-OKs-108-billion-budget-on-5554561.php>.

³¹ Saño, Naderev and Richards, Julie-Anne, "Carbon Majors and Climate Justice," Project Syndicate, June 9, 2014 at <https://www.project-syndicate.org/commentary/naderev----sa-o-and-julie-anne-richards-propose-a-levy-on-fossil-fuel-producers-to-help-those-most-vulnerable-to-climate-change>.

³² Ibid.

Affected individuals, “deserve the world’s support – not just moral support, but genuine help in the form of effective, properly funded mechanisms designed to prevent, or at least alleviate, the climate-related hardships inflicted upon them by past and present industrialization.”³³

V. Worse yet, if carbon markets just benefit Wall Street then they just create new interest groups to capture the government and the financial markets

The Interpol Environmental Crime Programme now lists ten classifications of carbon crimes that have already occurred throughout the world and continue to remain a threat.³⁴ Those include:

- Manipulating measurements to fraudulently claim additional carbon credits (Additionality);
- Sale of carbon credits that either do not exist or belong to someone else;
- False or misleading claims with respect to the environmental or financial benefits of carbon market investments;
- Exploitation of weak regulations to commit financial crimes;
- Tax Fraud;
- Securities Fraud;
- Transfer mispricing;
- Money laundering;
- Internet crimes and computer hacking to steal carbon credits; and
- Phishing/Theft of personal information or identity theft.

Some environmentalists even get it. Friends of the Earth has recognized such crimes and, as a result, advocates a carbon tax rather than cap and trade.³⁵

Still, politicians remain preternaturally attracted to cap and trade, even as carbon markets continue to grow and problems continue to mount.

A. Investor Fraud

As carbon markets grow, the carbon fund market has grown, as well. Carbon funds – like mutual funds with stocks or bonds – accept (private or public) investor money to purchase carbon permits. According to the latest survey by Carbon Finance, a carbon market data service published by Environmental Finance, over 2008-09, funds under management grew by 20 per cent to \$16.1bn (£9.8bn, €10.7bn). The number of carbon funds and government purchase programs increased from 80 to 88.³⁶

³³ Ibid.

³⁴ Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

³⁵ Chan, Michelle, “Ten Ways to Game the Carbon Market,” Friends of the Earth USA, http://www.foe.org/sites/default/files/10waystoGametheCarbonMarkets_Web.pdf.

³⁶ “Carbon funds grow despite problems,” Financial Times, Dec 7, 2009; Page: SR7-6.

Mark Nicholls, editor of Environmental Finance, who published the survey noted that, “thirty-eight of the 88 funds listed are governmental carbon purchasing vehicles, or are run by multi-laterals either for governments or emitting companies, or a combination.... The majority of the remainder are open to institutional investors.” “Of the 12 funds that were launched since the 2008-09 edition, only two were governmental or multilateral; the rest were private sector vehicles.”³⁷

The returns can be lucrative. “The European Carbon Fund, run by French bank Natixis and one of the earliest run to generate a cash return, says that based on its net asset value at the end of 2008, the fund has generated an annual return of 27.8 per cent since its inception in April 2005.”³⁸

The problem is that such returns quickly attract fraudulent schemes.

Interpol reported that in 2009 and 2010, an Australian investment firm ran an aggressive telemarketing strategy advertising false connections to legitimate organizations and environmental standards. Potential investors were offered a high return investment opportunity in carbon credits. The firm is estimated to have defrauded Australian victims of \$3.2 million.³⁹

The FTAlphaville warned of a firm called “Enviro Associates” that was selling voluntary carbon credits for investment purposes, all the while warning that:

Voluntary Carbon Credits were not designed to be purchased for investment purposes; for that reason Carbon Credits (VERs) are not for all specifications of Investors due to its high risk and undeveloped market landscape and uncertainty...

*Individuals should be aware if they are purchasing for speculative means that there is little or no liquidity at present in the market which in turn would affect your ability to sell/exit from a holding at this time. This may change in the future.*⁴⁰

Enviro Associates claims to be a “clearing member” of Gemmax Solutions, a payments and clearing service. Britain’s Financial Conduct Authority warns, however, that:

Several unauthorized firms promoting and selling carbon credits are telling investors that carbon Neutral Investments Limited (CNI) or Gemmax Solutions, firms authorized by

³⁷ Ibid.

³⁸ Ibid.

³⁹ SCAMwatch, WesternField Holdings Inc. Carbon Credit Investment Scams, <http://www.scamwatch.gov.au/content/index.phtml/itemId/781866>. See also David Fogarty, Firm Accused of Carbon Scam May Face Legal Claims, REUTERS, Mar. 26, 2010, http://uk.reuters.com/article/2010/03/26/us-carbon-investment-fraud-idUKTRE62P19020100326_, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁴⁰ Murphy, Paul. A carbon comedy. October 15, 2013. <http://ftalphaville.ft.com/2013/10/15/1666352/a-carbon-comedy/>.

*us, will handle money in their investment. We believe this is done to suggest investors will be protected as though they are dealing with an authorized firm. But this is incorrect.*⁴¹

Without investor protection and regulatory oversight, carbon schemes continue to proliferate.

Britain's Financial Services Authority summarizes warnings to investors about carbon frauds and emphasizes that they do not regulate carbon credits in the same manner as shares of stock.⁴² Still, investors flock to these green "investment" opportunities.

In November 2013, Britain's FSA reported that it had shut down nineteen companies in the past fifteen months for bilking roughly 1,500 investors out of 24 million pounds (\$38.7 million) through selling carbon credits to individual investors.⁴³

The UK Insolvency Service said the firms mainly targeted the elderly with high pressure sales techniques and promises of hefty returns of more than 40 percent. "Salesmen played on peoples' keenness to 'do their bit' to save the environment while making an investment at the same time," the Service said in a statement.⁴⁴

The FCA in September released the findings of a survey of 125 carbon investors, showing not one had made any money from investing in the credits.⁴⁵

The watchdog said some 183 carbon firms have been put under investigation since 2011 and has listed many of them on its website.⁴⁶

In the US, carbon schemes have prompted several States Attorneys General, including those of California, Vermont, Arkansas, Delaware, Maine, Mississippi, Oklahoma, Illinois, Connecticut and New Hampshire, to back efforts by the Federal Trade Commission to investigate consumer fraud in the carbon offsets market.⁴⁷

⁴¹ Ibid. See also, BBC World News. Oct 12, 2012. 'Misleading' carbon credit claims by Enviro Associates' <http://www.bbc.com/news/uk-england-hampshire-20265034>.

⁴² Financial Services Authority. Carbon credit trading. May 5, 2012. http://www.fsa.gov.uk/consumerinformation/scamsandswindles/investment_scams/carbon_credit.

⁴³ Szabo, Michael. UK watchdog says investors lost 24 million pounds in carbon credit scam. November 6, 2013. Reuters. <http://www.reuters.com/article/2013/11/06/us-britain-carbon-fraud-idUSBRE9A50L020131106>.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ See for example, "States seek fraud protection for carbon offset market," 25 Jan 2008 at <http://www.ens-newswire.com/ens/jan2008/2008-01-25-091.asp>.

B. Corporate Fraud

Clean Development Mechanism (CDM) projects generate carbon credits based on the extent to which the project resulted in fewer emissions than would otherwise have occurred. Dan Welch, of *The Guardian*, wrote, “Offsets are an imaginary commodity created by deducting what you hope happens from what you guess would have happened.”⁴⁸

Companies, therefore, have an incentive to either inflate the estimate of emissions that would have occurred without the project or claim that the project will reduce emission by more than it actually does.

In order to constrain firms from mischaracterizing their projects, the CDM mechanism requires third-party validation and verification before a project receives carbon credits. Third-party verification is carried out by Designated Operation Entities (DOEs) certified by the CDM Executive Board.

Even independent third party auditors, however, may be susceptible to bribes or collusion to manipulate the results.

According to Transparency International, bribery is most common at the project approval stage. “Although kickbacks to officials have not been reported, a Russian agency reportedly asked for direct monetary payments. In South-east Asian countries, it is fairly common for developers to invite the authorities to workshops (with attractive per diems) before submitting projects for approval. In China, it is not uncommon for project developers to invite experts reviewing their projects to dinner.”⁴⁹

But even independent verification agencies are not immune to manipulation. In 2008 and 2009 respectively the UN temporarily suspended two independent organizations – Norwegian company Det Norske Veritas and Swiss firm SGS – after “spot checks found flaws in their methodologies.”⁵⁰ Investigations showed that both companies had approved projects without sufficient review.⁵¹

⁴⁸ Dan Welch, *The Guardian* June 16, 2007.

⁴⁹ Corruption and the Private Sector, Transparency International, 2009, at 44, available at http://www.transparency.org/whatwedo/pub/global_corruption_report_2009.

⁵⁰ At the time these two companies were dominating the validation/verification market. For further information see Michael Szabo, DNV Suspension Another Jab at Battered CO2 Scheme, *Reuters*, Dec. 2, 2008, <http://www.reuters.com/article/2008/12/02/us-carbon-dnv-idUSTRE4B04K120081202>, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁵¹ Danny Fortson, Carbon-Trading Market Hit as UN Suspends Clean-Energy Auditor, *THE TIMES*, Sept. 13, 2009, http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article6832259.ece; James Murray, DNV Wins UN Authorisation CDM Project Approval, *Business Green*, Feb. 16, 2009, <http://www.businessgreen.com/bg/news/1804681/dnv-wins-un-authorisation-cdm-project-approval>, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

“The UN inspection found one company had a flawed review process, inadequate preparation and training of their auditing staff, and an overall failure to assign auditors with the proper technical skills. The other was suspended after an inspection raised concerns about staff qualifications and the quality of its internal reviews.”⁵²

In a follow-up review in 2009, the five largest DOEs’ validation processes were scored on an A-to-F scale. None received a score higher than a D.⁵³

C. Permit Fraud

1. Counterfeiting

There are many example of fake or invalid carbon permits being sold to unwitting buyers.

In one infamous and convoluted example, in March 2010, the Hungarian government took possession of two million carbon credits which had been surrendered to them by Hungarian businesses.

The rules of the EU-ETS allowed the Hungarian government to legally sell these carbon credits to others because Hungary anticipated being below its Kyoto Protocol target. However, the EU rules prevented these credits from being re-used within the EU.⁵⁴ Thus, Hungary sold the carbon credits to Hungarian Energy Power, “with restrictions that they were ineligible for use in Europe and notified the European Commission of the sale.”⁵⁵ “Hungarian Energy Power then sold the credits to a British trading company, which resold them to a firm in Hong Kong. The Hong Kong firm, however, then put those same recycled carbon credits on BlueNext, a Paris carbon exchange⁵⁶, where a number of European brokers and banks purchased them not knowing the carbon credits had already been used in Europe.”⁵⁷

⁵² Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁵³ Mark Schapiro, Conning the Climate: Inside the Carbon Trading Shell Game, Harper’s Magazine, Feb. 2010, at 36, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁵⁴ See <http://www.euractiv.com/climate-environment/hungarys-sale-co2-credits-worrie-news-368250>, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁵⁵ Catherine Airlie, BlueNext Arranges 'Swap Back' of Recycled CO2 Credits After Trading Halt, BLOOMBERG, April 14, 2010, <http://www.bloomberg.com/news/2010-04-14/bluenext-arranges-swap-backs-of-recycled-co2-credits-after-trading-halt.html>, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁵⁶ Wrong Sort of Recycling, The Economist, Mar. 25, 2010, <http://www.economist.com/node/15774368>, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁵⁷ Danny Fortson and Jonathan Leake, Hunt for 'Rogue Trader' Over Recycled Carbon Credits, THE TIMES, Mar. 21, 2010 <http://www.timesonline.co.uk/tol/news/environment/article7069741.ece>, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

When BlueNext discovered the credits were ineligible for use in the EU, the exchange “immediately suspended trading sending the spot price for CERs spiraling downward.”⁵⁸ After shutting down for three days to isolate the problem credits, BlueNext facilitated “swap backs,”⁵⁹ in which the sellers bought back the credits. Prices rose to their previous levels when trading reopened.⁶⁰

While the European Commission has now closed the loophole that allowed the credits to re-enter the EU-ETS,⁶¹ the episode highlights the importance of “strong regulations for monitoring the transfer of carbon credits through several foreign exchanges, particularly cross-checking between those exchanges.”⁶²

2. Theft

Carbon permits are also the target of hackers. A hacking attack in November of 2010 resulted in the theft of 1.6 million carbon credits (valued at €23.5 million) from the Romanian registry account of Holcim Ltd., the world’s second largest cement-maker.”⁶³ Holcim immediately posted the identification numbers of the stolen credits on its website and law enforcement efforts between Romania and Liechtenstein were able to track and return 600,000 of the stolen credits.⁶⁴ Still, while the unique identification number of the carbon credits allowed them to be tracked, not all the credits could be returned to Holcim. As it turned out, some “jurisdictions required the holder to return the stolen credits to the legal owner at the holder’s loss, while other jurisdictions allowed the buyer to keep them, with the original owner carrying the loss.”⁶⁵

⁵⁸ The Wrong Sort of Recycling, *The Economist*, Mar. 25, 2010, <http://www.economist.com/node/1577436>.

⁵⁹ Catherine Airlie, BlueNext Arranges 'Swap Back' of Recycled CO2 Credits After Trading Halt, *BLOOMBERG*, April 14, 2010, <http://www.bloomberg.com/news/2010-04-14/bluenext-arranges-swap-backs-of-recycled-co2-credits-after-trading-halt.html>, in *Interpol Environmental Crime Programme. Guide to Carbon Trading Crime*, June 2013.

⁶⁰ The Wrong Sort of Recycling, *The Economist*, Mar. 25, 2010, <http://www.economist.com/node/15774368>, in *Interpol Environmental Crime Programme. Guide to Carbon Trading Crime*, June 2013.

⁶¹ EU Closes Carbon Emissions Trading Loophole, *Utility Week*, April 21, 2010, http://www.utilityweek.co.uk/news/news_story.asp?id=148910&title=EU+closes+carbon+emissions+trading+loophole, in *Interpol Environmental Crime Programme. Guide to Carbon Trading Crime*, June 2013.

⁶² *Interpol Environmental Crime Programme. Guide to Carbon Trading Crime*, June 2013.

⁶³ Catherine Airlie, EU Carbon Dioxide Emissions Permits Stolen from Romanian Unit of Holcim, *Bloomberg*, Dec. 1 2010, <http://www.bloomberg.com/news/2010-12-01/romania-s-holcim-says-eu-carbon-permits-stolen-from-its-account.html>, in *Interpol Environmental Crime Programme. Guide to Carbon Trading Crime*, June 2013.

⁶⁴ Emissionshandelsregister, Recent News: Million EUAs Stolen from Romanian Registry, Dec. 2, 2010, http://en.emissionshandelsregister.at/service/recent_info/items/news127.html, in *Interpol Environmental Crime Programme. Guide to Carbon Trading Crime*, June 2013.

⁶⁵ Catherine Airlie, EU Carbon Dioxide Emissions Permits Stolen from Romanian Unit of Holcim, *BLOOMBERG*, Dec. 1 2010, <http://www.bloomberg.com/news/2010-12-01/romania-s-holcim-says-eu>

In another high-profile incident, the European Union's emissions trading system was shut down for a week after cyber-thieves stole emissions allowances worth €7m (\$9.4m) from an account in the Czech Republic, while criminals also hacked into trading accounts in Austria, Poland, Greece and Estonia. "The Commission proposed tighter security measures in 2010 after discovering that hackers had broken into the registries where allowances are stored," but member states have repeatedly claimed they cannot afford the improvements.⁶⁶ It is easy to imagine a similar situation arising in US markets where states would have to bear such unexpected costs.

VI. Conclusion and Policy Recommendations

Economists agree, cap and trade does not work for carbon. So why do politicians continue to pursue such mechanisms? It seems to me that while some paint "climate deniers" as a problem in Congress, an equally troubling problem is "cap and trade failure deniers." Perhaps politicians think that adopting a "market" based solution will get them off the hook for tough decisions on carbon tax rates. But, unfortunately for the rest of us, doing so only exposes the US economy to new sources of fraud, theft, and risk of loss while raising energy prices WITHOUT reducing carbon output.

In fact, the conclusions of the House of Commons, Energy and Climate Change Committee, "The EU Emissions Trading System," Tenth Report of Session 2010–12, Volume I, 17 January 2012 (at 129), summarize my testimony as well, if not better, than I can write on my own:

Some proponents of the ETS suggest that the main flaws are rules that have been designed inadequately or have been badly applied, and could be reformed. We suggest that the failings are of a structural nature. The ETS is a market in a commodity that has been created by legislative fiat. The European Commission is both the supplier and the regulator of carbon as a commodity, a situation which has made the ETS particularly susceptible to rent-seeking behaviour. This should come as no surprise, since the history of emissions trading is littered with evidence that it helps companies and governments to pre-empt and delay making the structural changes necessary to address climate change.⁶⁷

carbon-permits-stolen-from-its-account.html; Macken, Ken, Strengthening Credibility in the EU ETS Following Security and Fraud Related Incidents 2-3 (June 2011), at p.5, conference paper available at http://inece.org/conference/9/papers/Macken_Ireland_Final.pdf, in Interpol Environmental Crime Programme. Guide to Carbon Trading Crime, June 2013.

⁶⁶ Chaffin, Joshua. Cyber-theft halts EU emissions trading. January 19, 2011. Financial Times. <http://www.ft.com/intl/cms/s/0/27ee8cb0-2401-11e0-bef0-00144feab49a.html?ftcamp=rss#axzz34XaYYLnS>.

⁶⁷ For more on CDM, see Tamra Gilbertson and Oscar Reyes (2009) Carbon Trading: how it works and why it fails, Uppsala: Dag Hammarskjöld Foundation, Ch 1 and 2.

This crucial task of reducing carbon emissions needs to be handled with care, lest we merely repeat the mistakes already experienced by established markets. We can't afford such setbacks.

Extending the analogy with central banking, members of Congress should remember that the National Monetary Commission studies central bank functions around the world for seven years before concluding upon the design of the US Federal Reserve System, having experienced two failed central banks before it. Let's take our time now and research existing carbon abatement mechanisms before embarking upon another two (or more) failed schemes that will enrich interest groups while continuing to allow carbon to grow as a national, and global, problem.

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