THE ADMINISTRATION'S EMPTY PROMISES FOR THE INTERNATIONAL CLIMATE TREATY

HEARING

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTEENTH CONGRESS

FIRST SESSION

November 18, 2015

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THE ADMINISTRATION'S EMPTY PROMISES FOR THE INTERNATIONAL CLIMATE TREATY

WEDNESDAY, NOVEMBER 18, 2015

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to call, at 10:05 a.m., in Room 2318, Rayburn House Office Building, Hon. Lamar Smith [Chairman of the Committee] presiding.

LAMAR S. SMITH, Texas
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House of Representatives
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Full Committee

The Administration's Empty Promises for the International Climate Treaty

Wednesday, November 18, 2015
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Witnesses

Dr. Anne Smith, Senior Vice President, Environment Practice Co-Chair, NERA Economic Consulting

Mr. Bill Magness, General Counsel and Senior Vice President, Governance, Risk and Compliance, ERCOT

Ms. Katie Dykes, Deputy Commissioner, Connecticut Department of Energy and Environmental Protection and Chair, Regional Greenhouse Gas Initiative, Inc.

Mr. Paul C. Knappenberger, Assistant Director, Center for the Study of Science, Cato Institute

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HEARING CHARTER

The Administration's Empty Promises for the International Climate Treaty

Wednesday, November 18, 2015
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

PURPOSE

The Committee on Science, Space and Technology will hold a hearing entitled *The Administration's Empty Promises for the International Climate Treaty* on Wednesday, November 18, 2015, in Room 2318 of the Rayburn House Office Building. The hearing will examine how the Administration will have difficulty meeting its commitments to the United Nations based on recent Environmental Protection Agency's (EPA) carbon emissions regulations.

WITNESS LIST

- **Dr. Anne Smith**, Senior Vice President, NERA Economic Consulting
- **Mr. Bill Magness**, Senior Vice President, Governance, Risk and Compliance, Electric Reliability Council of Texas
- **Ms. Katie Dykes**, Deputy Commissioner, Connecticut Department of Energy and Environmental Protection and Chair, Regional Greenhouse Gas Initiative, Inc.
- **Mr. Chip Knappenberger**, Assistant Director, Center for the Study of Science, Cato Institute

BACKGROUND

On June 2, 2014, EPA proposed the Clean Power Plan with the intent of regulating carbon emissions from existing source electricity generating units.[1] Under Section 111(d) of the Clean Air Act, EPA proposes that states formulate implementation plans to limit carbon emissions.[2] The scope and manner in which the rule has been conceived by the agency has been met with considerable opposition from many states and other stakeholders.[3]

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[1] Clean Power Plan Proposed Rule, U.S. EPA, *available at* http://www2.epa.gov/carbon-pollution-standards/clean-power-plan-proposed-rule.
[2] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34,830 (June 18, 2014), *available at* http://www.gpo.gov/fdsys/pkg/FR-2014-06-18/pdf/2014-13726.pdf.
[3] U.S. Chamber of Commerce, Comments on Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generation Units, Dec. 1, 2014, *available at* https://www.uschamber.com/sites/default/files/12.1.14-

The EPA's Clean Power Plan would require states to meet requirements for carbon emissions from electricity generating units.[4] The proposed rule required states to meet the carbon emissions standard through four Building Blocks: (1) improving the efficiency of coal steam electric generating units by an average of six percent; (2) relying more on combined cycle natural gas units for electricity in peak usage times to a 70 percent capacity factor; (3) constructing more zero and low-emitting power sources; and (4) and implementing energy efficiency measures to limit annual electricity demand by 1.5 percent annually.[5]

The EPA announced the final Clean Power Plan rule on August 2, 2015.[6] The final Clean Power Plan rule was finally published in the Federal Register on October 23, 2015 and will go into effect on December 22, 2015.[7] The final rule made the following changes to the proposed rule. In Building Block 1, which requires the improved efficiency of existing source power plants, the EPA lowered the required improvement to 4.3 percent per plant. In Building Block 2, which requires the substitution of natural gas for electricity generation, the final rule now assumes that natural gas plants can run at 75 percent of the net summer capacity, an increase from 70 percent. In Building Block 3, requiring the substitution of zero-emissions power sources, the EPA now assumes greater use of renewables than the proposed rule. The highly controversial and legally questionable Building Block 4 requiring states to adopt energy efficiency requirements was removed from the final rule. However, the rule still carves out benefits for states in an effort for them to adopt efficiency measures.

Additionally, the final Clean Power Plan rule created new emissions requirements for each state as compared to the proposed rule. EPA opted for a unified standard in the final rule, reflected in more stringent emissions guidelines for states that rely most heavily on fossil energy for electricity. Western and Midwestern states are required to cut their use of fossil energy the most under this final rule, with over 20 states facing carbon reductions greater than 30 percent of current output.[8]

Recently, the U.S. Energy Information Administration (EIA) produced a report at the request of Chairman Smith that found that EPA's proposed Clean Power Plan would force the retirement of a significant number of coal-fired power plants, increase electricity prices, and

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_comments_to_epa_on_proposed_carbon_emission_standards_for_existing_power_plants_clean_power_plan.pdf; Comment From the Attorneys General of the States of Okla., W. Va., Neb., Ala., Fla., Ga., Ind., Kan., La., Mich., Mont., N.D., Ohio, S.C., S.D., Utah, Wyo. on Proposed EPA Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units *available at* http://www.ok.gov/oag/documents/EPA%20Comment%20Letter%20111d%2011-24-2014.pdf.

[4] U.S. EPA, EPA Fact Sheet: Clean Power Plan National Framework for States, *available at* http://www2.epa.gov/sites/production/files/2014-05/documents/20140602fs-setting-goals.pdf.

[5] *Id.*

[6] U.S. EPA, Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Generating Units, Final Rule, *available at* http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule.pdf.

[7] https://www.federalregister.gov/articles/2015/10/23/2015-22842/carbon-pollution-emission-guidelines-for-existing-stationary-sources-electric-utility-generating

[8] E&E News Clean Power Plan Hub, *available at* http://www.eenews.net/interactive/clean_power_plan#updated_total_reduction_percentage.

decrease American GDP.[9] On June 24, 2015, the Subcommittees on Environment and Energy held a hearing examining the impacts of the Clean Power Plan as reported by the EIA.[10]

On October 16, 2015, the Electric Reliability Council of Texas released a report on the impacts of the Clean Power Plan on the state of Texas.[11] The report found that the rule could result in the retirement of 4,000 megawatts of coal-fired electricity generation within the ERCOT region. ERCOT also found that the price of electricity would rise by up to 16 percent by 2030. The report also states that ERCOT has concerns about the ability to maintain reliable electricity in periods of high-demand as a result of this EPA regulation.

On November 9, 2015, NERA Economic Consulting revised a report it produced on the proposed Clean Power Plan to reflect the changes in the final rule.[12] NERA's analysis shows that all lower 48 states would see electricity price increases due to the Clean Power Plan. Consumers in 40 states would see increases of at least 10%, with consumers in 28 states expected to experience increases on the order of 20% in their electricity costs. The annual compliance cost from this regulation is at least $29 billion per year.[13]

Despite EPA's contention that it is has provided states more flexibility to comply with the final rule, at least twenty-six states have sued EPA over the Clean Power Plan, citing an overreach of the agency's authority under the Clean Air Act and an unlawful attempt to usurp states' ability to regulate electrical generation systems as the basis for their challenge.[14]

The United Nations Climate Change Conference (COP 21) plans to meet in Paris from November 30 to December 11. COP21's objective is to achieve a legally binding agreement on greenhouse gas emissions from all nations of the world.[15] In November 2014, the Obama Administration announced that the U.S. would reduce its economy-wide greenhouse gas emissions by 26%-28% compared to a 2005 baseline, and re-iterated the pledge this past March to the international community through the "Intended Nationally Determined Contribution (INDC)."[16] So far the Administration has not released any analysis on how it developed this pledge. In 2009, then Secretary of State Hillary Clinton pledged to raise $100 billion annually for a Green Climate Fund to aid developing countries coping with climate change.[17] It is unclear how the Administration intends to fund any public financial support without Congressional

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[9] U.S. Energy Information Administration, Analysis of the Impacts of the Clean Power Plan, May 2015, *available at* http://www.eia.gov/analysis/requests/powerplants/cleanplan/pdf/powerplant.pdf.

[10] Information on this hearing is available at: https://science.house.gov/legislation/hearings/subcommittee-environment-and-subcommittee-energy-hearing-us-energy-information

[11] http://www.ercot.com/content/news/presentations/2015/ERCOT_Analysis_of_the_Impacts_of_the_Clean_Power_Plan-Final_.pdf

[12] http://www.americaspower.org/sites/default/files/NERA%20CPP%20Final%20Nov%207.pdf

[13] Ibid.

[14] http://www.rpc.senate.gov/policy-papers/avalanche-of-opposition-hits-epas-co2-rule

[15] http://www.cop21paris.org/about/cop21

[16] https://www.whitehouse.gov/the-press-office/2015/03/31/fact-sheet-us-reports-its-2025-emissions-target-unfccc

[17] http://www.nytimes.com/cwire/2009/12/17/17climatewire-hillary-clinton-pledges-100b-for-developing-96794.html

approval through the authorization and appropriations process.[18] The Green Climate Fund faces considerable uncertainty with a lack of financial commitments from developed nations.[19]

An important policy debate lies in how the Obama Administration intends for the United States to meet its proposed commitments to the United Nations on greenhouse gas emissions (the INDC) and financial aid (Green Climate Fund) that will bind future Administrations and Congresses. Furthermore, the Obama Administration expects the Clean Power Plan to play a central role towards achieving this pledge, while the Plan appears to have little effect on global climate. In addition, the complicated implementation schedules associated with Clean Air Act regulations make it unlikely that the Plan will be actually implemented by 2025.[20]

[18] http://www.nytimes.com/2015/09/30/business/getting-to-100-billion-in-climate-change-aid.html?_r=0

[19] http://www.business-standard.com/article/current-affairs/green-climate-fund-faces-uncertainty-115111300600_1.html

[20] http://www.epw.senate.gov/public/_cache/files/21ffe37a-8052-4498-ba78-18395db0fc42/holmstead.pdf

Chairman SMITH. The Committee on Science, Space, and Technology will come to order.

Without objection, the Chair is recognized to declare recesses of the Committee at any time.

Welcome to today's hearing entitled "The Administration's Empty Promises for the International Climate Treaty."

I recognize myself for five minutes for the purposes of an opening statement, and then I'll recognize the Ranking Member.

Over the last year, the Environmental Protection Agency has released some of the most expensive and burdensome regulations in its history. Today's hearing will examine how the Environmental Protection Agency's recent regulations will do little to meet the administration's pledge at the upcoming Paris talks to reduce global carbon emissions.

The so-called Clean Power Plan will cost billions of dollars, cause financial hardship for American families, and diminish the competitiveness of American industry around the world, all with no significant benefit to climate change. It is well documented that the Clean Power Plan will shut down power plants across the country, increase electricity prices and cost thousands of Americans their jobs.

New analysis by NERA Economic Consulting shows that this final rule will impose a tremendous cost on the American people. This includes $29 billion to $39 billion in annual compliance costs and annual double-digit electricity price increases in most states.

My home state of Texas would be one of the hardest hit. According to a recent report by the Energy Reliability Council of Texas, energy costs for customers in Texas may increase by up to 16 percent per year due to the Clean Power Plan alone.

EPA asserts that the Clean Power Plan will help combat climate change. However, EPA's own data demonstrates that claim is false. The EPA Administrator Gina McCarthy testified before this committee and agreed that this rule would have a minimum impact on climate. In fact, their data shows that this regulation would reduce sea level rise by only one one-hundreth of an inch, the thickness of three sheets of paper.

Furthermore, statements by President Obama and others that attempt to link extreme weather events to climate change are unfounded. The lack of evidence is clear: no increased tornadoes, no increased hurricanes, no increased droughts or floods.

The administration's claims are contradicted by the underlying science from the United Nation's Intergovernmental Panel on Climate Change. For instance, the IPCC found that there is "low confidence on a global scale," that drought has increased in intensity or duration. The same lack of evidence can be found in the IPCC reports for almost every parameter of extreme weather events.

Hurricanes have not increased in the United States in frequency, intensity, or normalized damage since at least 1900. And it has been a decade since a category 3 or stronger hurricane has hit the United States. Whether measured by the number of strong tornadoes, tornado-related fatalities or economic losses associated with tornadoes, the latter half of the 20th century shows no climate-related trend.

Scientific American recently stated that the link between climate change and extreme weather is merely an opinion. The administration's alarmism and exaggeration is not good science and intentionally misleads the American people. The Clean Power Plan represents massive costs without significant benefits. In other words, it is all pain and no gain.

Another example of how this Administration attempts to promote its climate agenda can be seen at the National Oceanographic and Atmospheric Administration. Its employees altered historical climate data to get politically correct results in an attempt to disprove the hiatus in global temperature increases.

NOAA conveniently issued its news release promoting this report just as the Obama Administration was about to announce its extensive climate change regulations. When the Science Committee raised concerns about NOAA's report, the agency refused to be transparent about its findings and provide documents to the Committee.

The American people should be suspicious of the motives of this Administration as it continually impedes Congressional oversight of agency actions tied to its extreme climate agenda.

In just a few weeks, world leaders will gather in Paris to discuss how to regulate carbon emissions. The Obama Administration touts the Clean Power Plan as the cornerstone of its promise to the international community to reduce greenhouse gas emissions. However, the U.S. pledge to the U.N. is estimated to prevent only a three onehundreths of one degree Celsius temperature rise. This is laughable even if the negative consequences are serious.

There is a reason the President chose to bypass Congress in order to negotiate a climate deal on his own. The President's plan gives control of U.S. energy policy oftentimes to unelected United Nations officials. This plan ignores good science and only seeks to advance a partisan political agenda. The President should come back to Congress with any agreement that is made in Paris on carbon emissions. He won't because he knows the Senate will not ratify it.

I look forward to hearing from today's witnesses about the impact of these burdensome EPA regulations on their states.

[The prepared statement of Chairman Smith follows:]

COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY
Lamar Smith, Chairman

For Immediate Release
November 18, 2015

Media Contact: Zachary Kurz
(202) 225-6371

Statement of Chairman Lamar Smith (R-Texas)
The Administration's Empty Promises for the International Climate Treaty

Chairman Smith: Over the last year, the Environmental Protection Agency (EPA) has released some of the most expensive and burdensome regulations in its history.

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It is well documented that the Clean Power Plan will shut down power plants across the country, increase electricity prices and cost thousands of Americans their jobs.

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The President should come back to Congress with any agreement that is made in Paris on carbon emissions. He won't, because he knows the Senate will not ratify it.

I look forward to hearing from today's witnesses about the impact of these burdensome EPA regulations on their states.

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Chairman SMITH. That concludes my opening statement, and the Ranking Member, the gentlewoman from Oregon, Ms. Bonamici, is recognized for hers.

Ms. BONAMICI. Thank you very much, Mr. Chairman. And thank you to all of our witnesses for being here today.

I'm especially looking forward to the testimony of Ms. Katie Dykes, the Deputy Commissioner of the Connecticut Department of Energy and Environmental Protection. It will be beneficial for the Committee to learn about the success of the State of Connecticut and the Regional Greenhouse Gas Initiative, known as RGGI, which is reducing carbon emissions while simultaneously growing the region's economy.

And after my opening statement, Ms. Esty from Connecticut will be sitting here in the Ranking Member chair.

The success of RGGI highlights how we can have strong environmental regulations and a strong economy. They are not mutually exclusive. This is not just true in the United States; it's a growing reality now accepted by many other nations.

And I'm looking forward to discussing the Clean Power Plan, which builds on the history and accomplishments of the Clean Air Act and the mission of the EPA to protect public health and the environment. Our commitment to a cleaner future is what allows the United States to lead by example and galvanize the international community to take meaningful steps to address the issue of carbon emissions and climate change. The Clean Power Plan in the upcoming negotiations in Paris are necessary if we stand any chance, not just as a country but as a world, of lessening the effects of climate change on our States, our country, and our planet.

Some here today might question the climate scientists and their research, yet the overwhelming body of scientific research shows that we must take action to avoid the most serious effects of climate change. Thankfully, over the last few years there have been numerous studies that clearly show the costs and risks associated with not acting to address climate change. Those are very large.

For example, a recent study by the World Bank found that, without the right policies, rising seas and severe weather events could force more than 100 million people into extreme poverty. This is just one of the stark statistics reflecting the potential impacts of climate change.

I'd also like to point out that the scientific community is not alone in its call for action. The business community has called for action on climate change as well. In my home State of Oregon many companies have stepped up and demonstrated their support to address climate change. Nike, Intel, Iberdrola USA, International Paper, LAM Research, and Portland General Electric are just a few examples of many that have joined more than 80 companies nationwide in signing the American Business Act on Climate Pledge. These companies have made business-specific commitments to take significant actions to address climate change and expressed their support for a strong Paris agreement.

The Clean Power Plan is a critical element of our domestic efforts, and it represents an opportunity for American ingenuity. Environmental regulations often act as a catalyst to create new jobs and new markets, as well as the savings that come with a

healthier, more productive workforce and population. In 2012, the Department of Commerce estimated that the American environmental technologies industry generated approximately $312 billion in revenues with a global market of more than $800 billion, employing nearly 1.7 million Americans, and supporting 60,000 small businesses.

The United States should remain a global leader in clean energy technologies and benefit from the much-needed transition to a low carbon economy. When you have the scientific and business communities agreeing that action to address climate change is necessary and that the benefits outweigh the risks, it is clearly time for Congress to listen. I am hopeful that with the United States' leadership and commitment, the U.N. climate negotiations will result in meaningful actions to address our biggest environmental challenge.

Thank you, Mr. Chairman, and again, thank you to our witnesses for being here this morning. I look forward to all of your testimony, and I yield back the balance of my time.

[The prepared statement of Ms. Bonamici follows:]

Opening Statement – Ranking Member Bonamici
House Committee on Science, Space, and Technology
"The Administration's Empty Promises for the International Climate Treaty"

November 18, 2015

Thank you, Mr. Chairman, and thank you to our witnesses for being here today. I am especially pleased to welcome Ms. Katie Dykes, the Deputy Commissioner of the Connecticut Department of Energy and Environmental Protection. It will be beneficial to learn more about the success of the State of Connecticut and the Regional Greenhouse Gas Initiative, RGGI, which is reducing carbon emissions while simultaneously growing the region's economy. The success of RGGI highlights how we can have strong environmental regulations and a strong economy; they are not mutually exclusive. This is not just true in the United States, it is a growing reality now accepted by many other nations.

And I am looking forward to discussing the Clean Power Plan, which builds on the history and accomplishments of the Clean Air Act and the mission of EPA to protect public health and the environment.

Our commitment to a cleaner future is what allows the United States to lead by example, and galvanize the international community to take meaningful steps to address the issue of carbon emissions and climate change. The Clean Power Plan and the upcoming negotiations in Paris are necessary if we stand any chance, not just as a country, but as a world, of lessening the effects of climate change on our states, country, and planet.

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Thank you, Mr. Chairman, and again thank you to our witnesses for being here this morning.

I yield back the balance of my time.

Chairman SMITH. Thank you, Ms. Bonamici.

Let me introduce our witnesses. Our first witness today is Dr. Anne Smith, Senior Vice President and Environmental Practice co-Chair for NERA Economic Consulting. Dr. Smith is an expert in environmental policy assessment and corporate compliance strategy planning. She specializes in market impact analysis, risk management integrated policy assessment, and the design and performance of emissions trading programs. Dr. Smith previously served as an economist in the Office of Policy Planning and Evaluation at the EPA. Dr. Smith received her bachelor's degree in economics from Duke University and her master's and Ph.D. from Stanford.

Our second witness is Mr. Bill Magness, General Counsel and Senior Vice President for Governance, Risk, and Compliance for the Electric Reliability Council of Texas, or ERCOT. Mr. Magness has worked on utility issues for more than 20 years and has served as lead counsel in utility commission proceedings in 16 States. In addition, he served as a federal prosecutor early in his career. Mr. Magness received his bachelor's degree from the University of Texas and his law degree from the University of Pennsylvania.

I now recognize the gentlewoman from Connecticut, Ms. Esty, to introduce our next witness, Ms. Katie Dykes, Deputy Commissioner for the Connecticut Department of Energy and Environmental Protection and Chair of the Regional Greenhouse Gas Initiative. I hope I didn't use up too much of your introduction by mentioning that, but the gentlewoman from Connecticut is recognized.

Ms. ESTY. Thank you, Chairman Smith and Ranking Member Bonamici. I'm especially pleased to welcome and introduce Connecticut's Deputy Commissioner for Energy, Ms. Katie Dykes, as one of our esteemed witnesses on today's panel.

As a Deputy Commissioner of the Connecticut Department of Energy and Environmental Protection, which we refer to as DEEP, Ms. Dykes is an invaluable director of Connecticut's efforts to bring cheaper, cleaner, more reliable energy to our state. In addition, Ms. Dykes currently serves as the Chair of the Board of the Regional Greenhouse Gas Initiative, known as RGGI.

Connecticut is proving as one of the laboratories of the States in the Jacksonian/Jeffersonian model that we can protect the environment, reduce emissions, and sustain and support a strong economy. Through her leadership with RGGI and development of innovations like the Connecticut Energy Efficiency Fund, she's the perfect spokesman for a cleaner, more prosperous energy future. Prior to her service in Connecticut, Ms. Dykes served as Deputy General Counsel for the Council on Environmental Quality at the White House and as Legal Advisor to the General Counsel of the U.S. Department of Energy.

Finally, I would be remiss if I failed to mention that Yale Law School is proud to claim her as an alum. She's a classmate of the Chairman's daughter.

Chairman SMITH. No fair mentioning that now.

Ms. ESTY. And I also have to confess she was one of my husband's star students, and he convinced her to return to Connecticut to take up her present duties. So thank you so much for joining us here today, and thank you for indulging me in that.

Chairman SMITH. Thank you, Ms. Esty, for that introduction.

Our final witness today is Mr. Paul Knappenberger, Assistant Director for the Center for the Study of Science at the Cato Institute. Mr. Knappenberger has over 20 years of experience in climate research and public outreach, which includes ten years with the Virginia State Climatology Office and 15 years as a Research Coordinator for New Hope Environmental Services. Mr. Knappenberger received his bachelor's and master's degrees in environmental sciences from the University of Virginia.

We clearly have star witnesses today. We welcome you all. And, Dr. Smith, if you'll begin with your testimony.

TESTIMONY OF DR. ANNE SMITH,
SENIOR VICE PRESIDENT,
NERA ECONOMIC CONSULTING

Dr. SMITH. Mr. Chairman, Ranking Member Bonamici, and Members of the Committee, thank you for your invitation to participate in the hearing today. I'm Anne Smith of NERA Economic Consulting. My testimony today is my own and does not represent a position of my company or its clients.

I have a Ph.D. in economics, and I've spent the past 25 years assessing costs and benefits of numerous types of climate policies for governments, businesses, research groups, and NGOs.

My NERA colleagues and I have just completed a detailed analysis of the costs of EPA's final Clean Power Plan or CPP. We used NERA's integrated energy and macroeconomic model, which has been tested out multiple times in the modeling forums that Stanford University organizes. We use the most recent data on technology and energy markets from the U.S. Energy Information Administration, which is the government's independent and impartial source of energy information for policy analysis.

Our analysis estimated both distributional impacts and macroeconomic costs of the CPP. We found that the fossil energy sectors face extensive impacts. For example, under the CPP's mass-based caps, over the period 2022 to 2033, energy sector expenditures increase by a present value of $220 billion to $292 billion. Those spending increases translate into electricity rate impacts. When averaged over those same years, we find rates higher by 11 percent to 14 percent than if there were no CPP.

From the macroeconomic perspective, net costs to the economy are also substantial. For example, after accounting for economy-wide interactions and rebating all allowance values to consumers, the CPP reduces U.S. consumer spending by a present value of $64 billion to $79 billion.

I've heard comments that NERA's estimates are not credible because they are supposedly much higher than EPA's. But they are not higher. We examined the details of EPA's cost analysis, and we found that EPA's own comparable estimates are $76 billion, present value. In other words, an apples-to-apples comparison finds that EPA's costs are essentially the same as NERA's. And the reason it may seem our estimates are higher is because EPA has reported its annual cost estimates incorrectly. For example, for 2020 EPA's Regulatory Impact Analysis reports compliance spending that is only $1.4 billion, but we found that EPA actually estimated

spending in that year would be $17.4 billion. My written testimony explains how these facts can be found in EPA's documents.

But just yesterday, I was digging yet deeper into EPA's cost outputs, and I discovered yet another problem. The CPP requires that States prevent leakage if they choose the mass cap compliance option. Leakage would occur if uncovered emitters increase their emissions to offset the reductions of the CPP-covered sources. And I discovered that EPA's analysis of the mass cap for the CPP does not include such leakage prevention and that EPA actually analyzed a cap that's about 11 percent less stringent in 2030 than the CPP requires. That means, of course, that EPA's cost estimate is an underestimate.

I've spoken mainly about costs, but there are concerns about EPA's estimates and benefits as well. For example, EPA tells us that the CPP will prevent thousands of deaths and many more asthma attacks and sick days, and such health benefits account for about half of EPA's estimates of the final CPP's benefits. But none of these purported health benefits of the CPP are due to climate impacts. Those estimates are all due to reductions in non-greenhouse gas emissions. EPA already regulates those other emissions to levels that are protective of the public health, and that fact undercuts any rationale for viewing those estimates as credible estimates of the benefits of the CPP.

I've also prepared a written statement and I request that it be submitted into the record.

[The prepared statement of Dr. Smith follows:]

Summary of Key Points
in Testimony of Anne E. Smith, Ph.D.
at a Hearing on
EPA's Final Clean Power Plan Rule
by the
Committee on Science, Space, and Technology
United States House of Representatives
Washington, DC

November 18, 2015

- NERA Economic Consulting has performed an analysis of the potential energy sector, energy cost, and net consumer impacts of the CPP, using an integrated energy-macroeconomic model and up-to-date input assumptions from public sources.
- Projected impacts to the U.S. fossil-energy sectors under alternative mass-based scenarios are extensive. For example:
  - Energy sector expenditures from 2022 through 2033 increase by $220 billion to $292 billion (present value in 2016 relative to baseline projections, 2015$).
  - The average annual increase is $29 billion to $39 billion per year (2015$).
  - Average annual U.S. retail electricity rates are higher by 11% to 14% (relative to average baseline rates over the period 2022-2033).
- Projected net impacts to the U.S. economy, (after netting out any energy sector costs to purchase allowances, and accounting for increases in demand outside of the fossil-energy sectors) are also extensive. For example:
  - U.S. consumer spending power is projected to fall $64 billion to $79 billion (present value in 2016 relative to baseline from 2022-2033, 2015$).
- A rate-based implementation of the CPP that NERA also analyzed projected potential impacts similar in magnitude to those for the mass-based scenarios.
- The cost estimates that EPA has reported in its CPP regulatory impact analysis (RIA) for the years 2020, 2025, and 2030 are not correct representations of the true spending projected by EPA's analysis for those years.
  - Using EPA output files, NERA has determined that EPA actually projected spending levels of $17.4 billion in 2020 and $11.4 billion in 2025 (2011$).
- An "apples-to-apples" comparison shows that NERA's impact estimates are very similar to those of EPA, once the flaws in EPA's reporting of its own cost estimates are corrected.
- None of the 3,600 deaths, 90,000 asthma attacks, and 300,000 sick days reported as CPP benefits is associated with climate changes; these "co-benefits" are based on non-greenhouse gas emissions that are already regulated by EPA to levels that are protective of the public health under another provision of the Clean Air Act.

Written Testimony of
Anne E. Smith, Ph.D.
at a Hearing on
EPA's Final Clean Power Plan Rule
by the
Committee on Science, Space, and Technology
United States House of Representatives
Washington, DC

November 18, 2015

Mr. Chairman and Members of the Committee:

Thank you for your invitation to participate in today's hearing. I am Anne E. Smith, a Senior Vice President of NERA Economic Consulting, and co-head of NERA's global environmental practice with Dr. David Harrison. My testimony reflects my own opinions, and not any position of my company, NERA Economic Consulting, or its clients.

I am a specialist in environmental risk assessment and economic impact analyses to support environmental policy decisions. I have performed air quality cost and benefits analyses and risk assessments over my entire career, including as an economist in the Office of Policy, Planning, and Evaluation of the U.S. Environmental Protection Agency (EPA), as a consultant to the EPA, and in many consulting engagements since then for government and private sector clients globally. I have also served on several committees of the National Academy of Sciences focusing on risk assessment and risk-based decision making, and on advisory boards of the EPA. Specific air quality issues I have analyzed include greenhouse gases, fine particulate matter ($PM_{2.5}$), ozone, mercury, regional haze, and others. I have been extensively involved in assessment of the evidence on risks from

ambient $PM_{2.5}$ and ozone for twenty years, and have performed analyses of the impacts of climate change and climate policies for even longer.

I hold a Ph.D. in Economics from Stanford University, with a Ph.D. minor in Stanford's School of Engineering, a M.A. in Economics from Stanford University and a B.A. in Economics from Duke University, *summa cum laude*.

I thank you for the opportunity to share my perspective today on EPA's final Clean Power Plan (CPP) rule, which was promulgated on October 23, 2015.[1] My written statement provides a summary and explanation of an analysis that I co-directed with my colleague, Dr. David Harrison, to assess the economic implications of the CPP on the electricity sector, energy markets, and net effects on consumers.[2] I am also entering into the record a full copy of that analysis as Attachment A to this written submission. My written and oral testimonies reflect my own opinions, and do not represent any position of my company, NERA Economic Consulting, or its clients.

Overview of the Final Clean Power Plan Rule

The CPP is a nationwide regulation under Section 111(d) of the Clean Air Act that regulates two subcategories of existing electricity generating units: fossil fuel-fired steam units and combined-cycle combustion turbines. The rule sets maximum limits on CO_2 emission rates, measured in pounds of CO_2 per megawatt-hour (lb./MWh) for

[1] U.S. Environmental Protection Agency, *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, Final Rule, 80 Fed. Reg. 64661, October 23, 2015.

[2] The final CPP impact analysis is presented in NERA, *Energy and Consumer Impacts of EPA's Clean Power Plan*, prepared for American Coalition for Clean Coal Electricity, November 7, 2015 (available: http://www.nera.com/publications/archive/2015/energy-and-consumer-impacts-of-epas-clean-power-plan.html.) This analysis followed the same methodology that NERA employed for an analysis of the impacts of the *proposed* rule, which was documented in an October 16, 2014 NERA report, *Potential Energy Impacts of the EPA Proposed Clean Power Plan*, which is also available on NERA's website.

electricity systems within individual states.[3] A state's emissions rate outcome, which would be compared to its CPP limit to determine compliance, will be calculated using a specific formula that accounts for the emissions from the affected generating units divided by their generation (in MWh), but also including the generation from new renewable and nuclear capacity, plus future incremental reductions in generation due to verified end-use energy efficiency projects. The final rule also provides states with an alternative compliance structure that would impose a CO_2 cap for total emissions from the regulated generation generators in each state ("mass cap"). The rule identifies the level of the mass cap that would apply in each state, based on EPA's assessment of the emissions that would be equivalent to complying with the state's rate-based limit. The limits, whether rate- or mass-based, are phased in from 2022 through 2030. According to EPA's estimates, by 2030, total U.S. power sector CO_2 emissions will be 32% below their level in 2005. The rule also allows states to trade with other states that elect the same generic regulatory option, as in the Regional Greenhouse Gas Initiative (RGGI) in nine Northeastern states that began in 2009.

EPA set the state CO_2 emission rate limits based on its analysis of emission reduction opportunities in each state. EPA evaluated the opportunities in terms of three Building Blocks that can be summarized as follows:

1. Building Block 1—Heat rate improvements at coal units;
2. Building Block 2—Increased utilization of existing natural gas combined cycle (NGCC) units; and

[3] The rule does not set CO_2 emission rate limits for Vermont or Washington, D.C., because these jurisdictions do not have any affected fossil-fired power plants. The rule also does not set CO_2 emission rate limits for Alaska or Hawaii because EPA lacked the information and tools to set limits on these states.

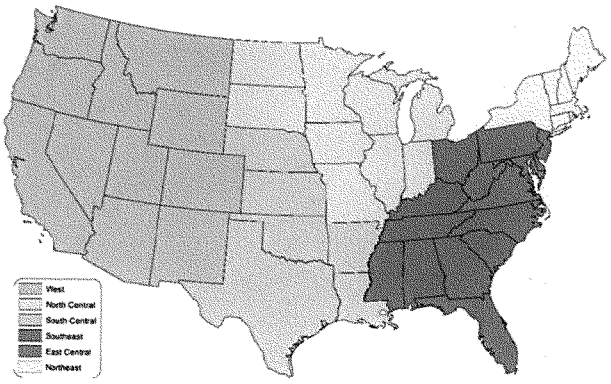
3. Building Block 3—Increases in renewables and nuclear energy.

The mass limits were then estimated based on projected compliance with the rate limits.

Objectives of NERA's Study and Scenarios Analyzed

NERA's principal objective was to evaluate the potential impacts of the CPP to the fossil-energy sector, to energy costs, and to the economy as a whole, focusing on results over the period from 2022 through 2033 (2022 marking the beginning of the ramp up of EPA's rate limits, and 2033 representing a date after the point where the most stringent rates must be achieved, *i.e.*, 2030). We developed impact estimates under two primary scenarios for compliance with mass-based caps. Both presume least-cost compliance, the first using intra-state trading, and the second allowing trading to occur across states within six multi-state regions following the same regional boundaries that EPA used to analyze regional trading in the RIA for the proposed CPP (see Exhibit 1).

Exhibit 1. Regions for Inter-State Trading in NERA's Mass-Based Scenario with Regional Trading (Based on inter-state trading regions used by EPA in its Proposed CPP RIA)



Mass-based trading schemes will require creation of emissions allowances (*i.e.*, rights to emit a ton of CO_2), the distribution of which affects the ultimate cost burdens of the regulation on different sectors and individuals. Many alternative allocation schemes have been used or proposed in past cap-and-trade programs. NERA's analysis has assumed two allocation cases for each mass-based scenario:

1. **No LDC allocation.** Allowances are auctioned to generators, with none of the proceeds distributed to local distribution companies (LDCs) for electricity.[4]
2. **50% LDC allocation.** Half of the allowances are auctioned to generators, with the other half freely distributed to LDCs and used as a credit on retail rates.

For all cases, our analysis assumes that 100% of the allowance value is returned to consumers by some route. In the case with allocation of a part of the allowances or auction proceeds to LDCs, that part of the allowance value serves to lower utility costs that otherwise would be passed through to customers—and thus to lower electricity rate impacts. The remainder of the allowance value is returned to consumers in an economically-neutral manner that economists call "lump sum." The key feature of a lump sum rebate is that the value is recycled to each individual recipient in a fixed quantity, rather than in the form of reduced income tax *rates*, or reduced electricity *rates* – which are approaches that can affect consumer behavior in ways that then have secondary effects on markets and economic outcomes. Lump sum redistributions could include per-household dividend checks, or per-person income tax rebates, among other

[4] LDCs are the entities households know of as "electric utilities." LDCs do not necessarily own any of the regulated generating units, and may only buy their power from generators. LDCs set retail electricity rates on the basis of costs, and so a free allocation to an LDC or the distribution of some of an allowance auction's proceeds to an LDC reduces electricity rates, thus reducing rate impacts of the CO_2 price.

means. The key point is that NERA's analysis returns the full value to the allocations to the economy no matter what allocation case is assumed. The only issue is by what route. After the free allocations to LDCs to mitigate electricity rate increases, we assume the remaining value is returned via economically-neutral transfers so that none of our reported impacts on consumers is inflated by the fact that states are presumed to create allowance programs as a means of encouraging cost-effective compliance strategies.

The two alternative allocation cases form a range for our reported results for each of the two mass-based scenarios. We have also analyzed a scenario in which all states follow a rate-based compliance approach. For that scenario, we considered only intra-state trading of emission reduction credits (ERCs). There are no allowances to allocate in a rate-based approach, and so for that scenario there is no range on the results.

NERA's presumption of least-cost compliance (within the specified trading boundaries) may understate the real-world impacts and costs of the CPP. Impacts also may be understated by NERA's assumptions of perfect foresight on the part of affected parties and no uncertainty or market imperfections. Additionally, our analysis does not include several types of cost that might be required to meet the electricity supply and demand changes estimated to be least-cost, such as potential needs to upgrade the existing infrastructure for electricity transmission or natural gas supply.

NERA's Analytical Methodology

NERA used its state-of-the-art, peer-reviewed energy-economic model—called N_{ew}ERA—to develop estimates of the least-cost electricity system compliance actions and their associated costs and potential macroeconomic impacts on the U.S. economy.

N_{ew}ERA is an economy-wide integrated energy and macroeconomic model that includes a bottom-up, unit-specific representation of the electric sector, as well as a representation of all other sectors of the economy and households. It assesses, on an integrated basis, the effects of major policies on individual sectors as well as the overall economy. It has substantial detail for all of the energy sources used by the economy, with separate sectors for coal production, crude oil extraction, electricity generation, refined petroleum products, and natural gas production. The model performs its analysis with regional detail. The CPP analysis used state-specific cost inputs.

More detailed documentation of the N_{ew}ERA model is available in Appendix 1 of the report provided in Attachment A of this testimony, and I will here just highlight the key assumptions of the N_{ew}ERA base case used in our CPP analysis.

The N_{ew}ERA electricity module used for our CPP analysis adopted the most recent estimates of future natural gas and oil prices, electricity demands, and new technology costs released by the U.S. Energy Information Administration (EIA) with its *Annual Energy Outlook 2015* (*AEO 2015*). The *AEO 2015* Reference Case assumptions were used. The electricity sector's base case reflects compliance with current environmental regulations (*e.g.*, the Mercury and Air Toxics Standards) and other policies. This includes two major existing programs to reduce CO_2 emissions in the electricity sector, the Regional Greenhouse Gas Initiative (RGGI) and the California AB 32 cap-and-trade program. The electricity sector base case also includes all generating unit retirements that had been publicly announced as definite by August 2015.

The parameters of the macroeconomic portions of N_{ew}ERA (*i.e.*, projections for sectors other than the electricity sector) were estimated (*i.e.*, "calibrated") to match the *AEO 2015* Reference Case projections under the base case scenario. Thus, both the macroeconomic and electricity sector components of the model used in NERA's CPP cost analysis start from a base case reflecting the EIA's most recent projections of energy and economic activity.

The N_{ew}ERA base case for the CPP analysis does not include the additional end-use energy efficiency potential that EPA assumes is available for CPP compliance, but it does include that potential as a compliance option, as I will discuss further below. Consistent with EPA's own analysis, NERA assumed that even highly cost-effective energy efficiency improvements would only start to be implemented once the CPP limits are in effect—an assumption that reduces the estimated costs of meeting the CPP limits.[5] It reduces estimated costs because all of the economic gains of the cost-effective energy efficiency are attributed to the CPP rule.

NERA Assumptions Related to Options for Compliance with CPP

As I have already explained, NERA assumed least-cost compliance rather than the specific mix of the building block options that EPA used to set each state's emission rate limit or mass limit. Although NERA's analysis leaves the mix of compliance options completely unconstrained, I will describe our analysis's compliance-related options for each building block category.

[5] NERA's analysis does assume, however, that California adopts the end-use energy efficiency measures as part of its compliance with the "complementary measures" under its AB 32 program, which is part of the base case.

Building Block 1 – Heat Rate Improvements for Coal Units

In its calculations of state targets, EPA assumed a range of cost and effectiveness of heat rate improvements (*i.e.*, increased efficiency in generation) that all coal units could achieve, a range that differs by region of the U.S. NERA's analysis adopts the same assumptions as EPA's. These are a 4.3% improvement in the Eastern Interconnection, 2.1% in the Western Interconnection, and 2.3% in the Texas region. EPA assumed these improvements can be achieved at a capital cost of $100/kilowatt (kW),[6] which NERA also has assumed. NERA's analysis further assumes that units undertaking a heat rate improvement will be subject to New Source Review. This would reduce such retrofits' cost-effectiveness for some units that are not maximally controlled for other types of emissions. This assumption has *de minimis* impact on our results, but it is nevertheless consistent with the legal reality.[7]

Building Block 2 – Increased Utilization of Existing NGCC

In its calculation of state targets, EPA assumed that existing NGCC units could, by some point in time prior to 2030, increase their utilization to a 75% annual capacity factor, but set early interim rate limits to allow a more gradual transition, or "glide path" to that ultimate level.[8] Increasing utilization of existing NGCC units up to each unit's assumed maximum availability (which is 89% in the N_{ew}ERA model) is an option in all

[6] RIA, p. 3-24.

[7] While this set of assumptions has *de minimis* impact on our estimates of the impacts of the proposed CPP, their accuracy would be much more significant if the Section 111(d) limits for legal reasons had to be based solely on systems of emissions controls that can be achieved on the existing fossil units themselves. That legal situation would warrant a more thorough evaluation of heat rate improvement assumptions than we determined was necessary for our analysis.

[8] 80 Fed. Reg. 64661 (section V.D).

of our scenarios to the extent that it is cost-effective as either a market or CPP compliance option. The estimated incremental cost of this action depends upon the relative costs of the alternative sources of generation, which vary by electricity market region; the specific units backed down to achieve any increase in generation from existing NGCC units also are determined in N_{ew}ERA. No time constraints are placed on how rapidly NGCC units can reach their potential maximum utilization if it is cost-effective.

Building Block 3 – Increases in Renewable and Nuclear Generation

EPA's calculation of state targets includes the effects of generation from potential additions of new renewable units after 2012. Additions of new renewable and new nuclear generation also are among the CPP compliance options in NERA's analysis to the extent that they are cost-effective relative to other compliance options. Their cost-effectiveness is determined by their capital and operating costs. NERA's analysis used the capital and operating costs estimated by EIA for its *AEO 2015* forecasts. I summarize NERA's capital cost assumptions for new capacity in Exhibit 2, which also includes comparable assumptions for new natural gas capacity, as those assumptions may also affect the relative cost-effectiveness of Building Block 3-related compliance measures in a least-cost compliance outcome for CPP compliance.

Exhibit 2. NERA Analysis's Assumptions for New Renewables, Nuclear, and Natural Gas Generating Capacity (2015$; costs vary by region around these averages)

(Source: U.S. Energy Information Administration, *AEO 2015*)

Technology	Capital Cost (2020/2030) ($/kW)	Fixed O&M Cost ($/kW-yr)	Variable O&M Cost ($/MWh)	Heat Rate (MMBtu/MWh)	Maximum Capacity Factor[2]
Onshore Wind	$2,024 / $1,972	$40.92	$0.01	N/A	24% - 41%
Solar PV	$3,325 / $3,055	$25.55	$0.01	N/A	23% - 34%
Natural Gas Combined Cy	$992 / $969	$13.62	$3.73	7,050	87%
Natural Gas Combustion T	$741 / $715	$7.29	$10.74	9,750	70%
Nuclear [1]	$5,158 / $4,890	$96.52	$2.22	10,479	90%

(1) NewERA model does not allow any additions of new nuclear generating capacity until 2025.
(2) For new renewable units, the maximum capacity factor is stated as a range because it varies by model region.

Increases in End-Use Energy Efficiency

End-use energy efficiency was not treated as a building block by EPA when it calculated the CPP's state-specific limits but EPA does include it as an option for CPP compliance. Under a mass-based approach, reducing energy use is an option even if it is not specifically identified as such by the rule, because any action that reduces emissions from the capped sources is inherently an option. Under the rate-based approach, energy efficiency would need to be an allowable part of the compliance formula—which it is in the CPP. Thus, assumptions about the availability and cost of energy efficiency are important to estimates of the cost of the CPP under both approaches.

In its analysis of the proposed rule, EPA's assumed costs increased with the level of incremental energy efficiency the state added, ranging from $550/MWh for adding less than 0.5%, $660/MW for adding between 0.5% and 1.0%, and $770/MWh for adding more than 1.0% (all in 2011$). In our earlier analysis of the proposed rule, NERA reviewed the literature on the cost of energy efficiency and concluded that a cost of about $900/MWh (2011$) was an appropriate estimate of historical (*i.e.*, already-incurred)

efficiency improvement cost.[9] NERA assumed that value for the first tranche of reductions, and assumed costs for the higher tranches would increase in the same proportions that EPA had assumed. For its analysis of the final CPP, EPA has revised its cost estimate for the first 0.5% of improvement upwards to $1,100/MWh (2011$),[10] which is about the same level that NERA estimated for historical costs in its earlier review. NERA therefore adopted EPA's cost of $1,100/MWh (2011$) for the first tranche of energy efficiency improvements in its final CPP analysis.

Although EPA has revised upward its cost estimate for the first tranche of efficiency gains, EPA also has reversed its prior assumption that the cost per MWh of reduction would increase for larger percentage reductions, and instead assumes now that improvements of 0.5% up to 1.0% will cost less ($880/MWh reduced, 2011$), and less still ($660/MWh reduced, 2011$) for 1.0% efficiency improvements. We have reviewed EPA's explanations for this assumption, and do not find them compelling. EPA's assumption of declining costs is not consistent with experience in which the "low-hanging fruit" for improving energy efficiencies is used up in initial programs and deeper cumulative percentage improvements become more costly. This pattern would lead to a rising $/MWh supply curve for larger percentage reductions, as EPA assumed in its analysis of the proposed rule. However, recognizing that deeper cuts will also occur later in time (due to limits that EPA assumed on the amount of improvement per year), it is

[9] NERA developed this estimate based on information from Allcott, Hunt and Michael Greenstone. 2012. "Is There an Energy Efficiency Gap?" *Journal of Economic Perspectives*, 26(1):3-28. (Available: http://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.26.1.3). See NERA's 2014 report on the proposed CPP for more discussion of these energy efficiency cost estimates. (Available: http://www.nera.com/content/dam/nera/publications/2014/NERA_ACCCE_CPP_Final_10.17.2014.pdf.)

[10] EPA, *Demand-Side Efficiency Technical Support Document*, August 2015, Table 27, p. 70. (Available: http://www3.epa.gov/airquality/cpp/tsd-cpp-demand-side-ee.pdf.)

possible that the entire efficiency supply curve could shift downwards over time. To account for these two offsetting effects, NERA's analysis assumes a flat rather than a rising $/MWh curve, while adopting the same temporal constraints on the amount of improvement per year that EPA has assumed. Thus, NERA has assumed that any quantity of end-use energy efficiency improvement can be obtained at a cost of $1,100/MWh of reduction (2011$). While this is higher than EPA's cost for the larger improvements, it still assumes a large amount of technological progress (*e.g.*, "learning by doing") to offset the natural tendency for costs to rise as more ambitious programs are implemented.

We modeled the adoption of energy efficiency as a compliance option based upon its cost relative to alternative means of reducing CO_2 compliance emission rates to comply with the CPP. However, our very low cost assumptions result in our model selecting the entire potential supply of energy efficiency, consistent with EPA's assumption. As discussed in our 2014 report, however, there is a strong conceptual argument that cost-effective energy efficiency would be adopted in the absence of the CPP, *i.e.*, in the base case to which the CPP case is compared when deriving the cost and impacts of the CPP.

Potential Compliance Costs Not Included in NERA's Analysis

The cost and effectiveness assumptions of the above options were used in the N_{ew}ERA model to estimate the least-cost compliance paths for each trading region. There are several potential sources of compliance costs that have <u>not</u> been included in NERA's analysis. We made no attempt to assess needs for additional spending on

electricity transmission infrastructure or natural gas pipeline infrastructure in order to implement any of the compliance actions selected. The analysis also does not include any costs for states to prepare their implementation plans, or to execute those plans.

Spending and Consumer Impacts of the Clean Power Plan

The NERA analysis structure that I have summarized above estimated that incremental expenditures on energy to comply with the CPP will be very substantial. For the two mass-based scenarios for CPP compliance that NERA analyzed:[11]

- Energy sector expenditures from 2022 through 2033 increase by $220 billion to $292 billion (present value in 2016 relative to base case projections).
- The average annual increase is $29 billion to $39 billion per year.
- Average annual U.S. retail electricity rates are higher by 11% to 14% (relative to average baseline rates over the period 2022-2033).

The ranges reflect the different assumptions about potential free allowance allocations to reduce electricity rates, and about the regional scale of allowance trading. Exhibit 3 provides a more detailed summary of these and other key energy sector impact measures.

[11] Unless I state otherwise, all of the dollar values in my testimony are in 2015$.

Exhibit 3. Detailed Summary of NERA's Estimates of Energy Sector Impacts over the Period 2022-2033 for Mass-Based CPP Compliance Scenarios (2015$)

	Present Value of Expenditures	Annual Average Expenditures	Retail Electricity Rate	Henry Hub Natural Gas Price	Total CO_2 Emissions
	PV billion$	Annual avg billion$	¢/kWh	$/MMBtu	Annual avg MM metric tons
Baseline	$2,143	$333	11.1	$5.7	2,038
Mass-Based	$2,384 to $2,436	$364 to $372	12.3 to 12.6	$5.7 to $5.8	1,610 to 1,613
Change	+$241 to +$292	+$32 to +$39	+1.2 to +1.6	+$0.0 to +$0.0	(428) to (425)
% Change	+11% to +14%	+10% to +12%	+11% to +14%	+0% to +1%	-21% to -21%
Mass-Based with Regional Trading	$2,364 to $2,408	$362 to $368	12.3 to 12.6	$5.7 to $5.7	1,637 to 1,641
Change	+$220 to +$264	+$29 to +$35	+1.2 to +1.5	($0.1) to ($0.0)	(400) to (396)
% Change	+10% to +12%	+9% to +11%	+11% to +14%	-1% to -1%	-20% to -19%

Source: N_{ew}ERA modeling results.
Note: Present value is from 2022 through 2033, taken in 2016 using a 5% real discount rate. Annual averages and retail electricity rates are averages over the same period. Dollars in constant 2015 dollars. The ranges on results for each alternative trading scenario reflect the proportion of allowances freely allocated to LDCs, which varies from no LDC allocation to 50% LDC allocation. By 2031, annual CO_2 emissions are 36% to 37% lower than they were in 2005.

The energy expenditure estimates include changes in spending for energy efficiency improvements that reduce electricity demand, changes in spending to meet the remaining demand, changes in costs to purchase natural gas for non-electric needs, and any necessary allowance purchases.[12] Some of that spending, such as allowance purchases, is distributional in nature, as they also imply increased revenues in other parts of the economy.

NERA's analysis was also macroeconomic in scope, meaning that it also reports the net resource cost to the entire U.S. economy of the CPP compliance expenditures net of transfer payments such as allowance purchases. NERA's macroeconomic analysis projects that the CPP also will have a substantial net effect on overall societal spending power. Even after accounting for the offsetting benefits of reduced need for consumers

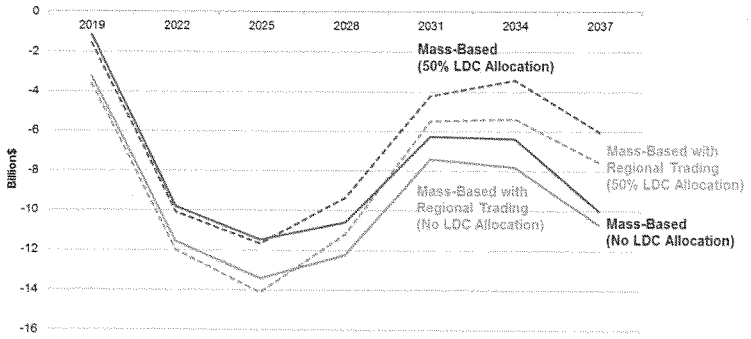
[12] Again, no costs for potential needs to upgrade electricity transmission or natural gas pipeline infrastructure have been estimated or included.

to purchase electricity, the reduced electricity rates from any free allocations to local utilities, and the financial rebates to households from the value of auctioned allowances,

- Net economic losses to U.S. consumers are projected to be $64 billion to $79 billion (present value in 2016 relative to baseline consumption from 2022-2033).

Exhibit 4 graphs the timing of the net societal costs of the CPP—as measured by reduced U.S. consumption—for the mass-based scenarios in NERA's analysis.

Exhibit 4. NERA's Estimates of Net Impacts to U.S. Consumption (Excluding All Allowance Costs) for Mass-Based CPP Compliance Scenarios
($ billions per year, relative to baseline consumption, 2015$)



Source: N_{ew}ERA modeling results, relative to baseline.
Notes: Net effects on U.S. spending power, including return to households of full value of allowances, either all through means other than lower electric rates (no allocation case) or half through reductions in electricity rates and half through another means (50% LDC allocation case).

The results I have described so far are for the mass-based compliance approaches that NERA modeled. Our full report (see Attachment A) also contains results for an illustrative rate-based compliance scenario in which each state achieves its limits on a least-cost basis using only within-state options. (This is consistent with trading of emission reduction credits (ERCs) on an intra-state basis.) This scenario's projected

impacts are similar to those projected for NERA's mass-based compliance scenarios. Despite generally similar impacts, however, there will be many differences in implementation challenges, distributional impacts, and long-term flexibilities between the mass-based and rate-based compliance alternatives. Determining these differences and the trade-offs they present to individual states would require additional analysis.

Comparisons of NERA's Cost Estimates to EPA's Cost Estimates

I have heard commentary on NERA's analysis that suggests it projects cost impacts that are exceedingly higher than EPA's. Such statements are based on the "apples-to-oranges" comparisons, and are misleading for that reason. I would like to explain some difficulties with EPA's reporting and provide the results of an "apples to apples" comparison that shows NERA's estimates actually are in the same ballpark as EPA's.

First, I want to point out a problem in the costs that EPA has reported in its Regulatory Impact Analysis (RIA).[13] The RIA provides an estimate of compliance cost on a per-year basis, and only for three points in time (2020, 2025, and 2030).[14] For the mass-based scenario, the RIA reports costs of $1.4 billion, $3.0 billion and $5.1 billion (2011$) for each of these three years.[15] But these figures are not correct representations of the true spending projected by EPA's analysis for those years. Using EPA's own

[13] EPA's RIA is available at http://www2.epa.gov/cleanpowerplan/clean-power-plan-final-rule-regulatory-impact-analysis.

[14] Although the CPP limits do not take effect until 2022, EPA's modeling assumes that compliance starts in 2020. This appears to be because EPA did not alter its IPM model periods to match those of the final CPP, and used the same model it had used for its proposed CPP analysis.

[15] RIA, Table ES-10, p. ES-23.

output files, NERA has determined that the actual spending levels projected by EPA in those three years are $17.4 billion, $11.4 billion, and $4.1 billion, respectively (2011$).

The reason for the discrepancy is that EPA has not reported the *annual* spending on end-use energy efficiency incurred in each of those years, but instead reported an "annualized" cost, which assumes that the cost of each year's end-use efficiency spending is somehow not incurred in that year but is instead incurred over a period of 21 years into the future. This is not the way the actual spending for energy efficiency programs will be incurred. Companies pay for those projects in the year in which they occur. I understand from discussions with utility companies (and supported by analyses of rate impacts by both EIA and EPA) that those full costs are also passed through to retail rates in the same year that they are spent.[16] Thus, EPA's RIA is understating the compliance costs in those years by a very substantial amount, effectively by re-assigning a large fraction of the end-use efficiency costs to years after 2030.[17]

An additional concern with the way EPA reports costs is its reporting of just three points in time. Since costs may vary from year to year, a more appropriate way to express the full costs of a policy is to provide a present value of the policy costs, as

[16] It is evident that EPA's analysts are aware of this fact because EPA's calculations of electricity rate impacts in those years do use the full annual energy efficiency spending, and not just the much smaller levels used to report compliance costs in Table ES-10 of the RIA.

[17] These problems in EPA's cost analysis were identified by my NERA colleague, Mr. Scott Bloomberg, who is an expert in the electricity sector modeling used in N_{ew}ERA and IPM. Mr. Bloomberg used three EPA output files to replicate the costs reported in the RIA, identify the error, and then to make the correction. The files are (1) for energy efficiency costs, www3.epa.gov/airquality/cpp/df-cpp-demand-side-ee-at3.xlsx; (2) for IPM Base Case cost outputs, www2.epa.gov/sites/production/files/2015-08/base_case.zip (Base Case SSR.xlsx, Table 1-16_US worksheet, Table 15); and (3) for IPM Mass-Based scenario cost outputs, www2.epa.gov/sites/production/files/2015-08/mass-based.zip (Mass-Based SSR.xlsx, Table 1-16_US worksheet, Table 15). NERA's spreadsheet documenting the replication and then the correction based on data copied from the above three files is provided as Attachment B to this testimony.

NERA has done. Using EPA's cost output files, we have estimated that EPA's own present value for compliance spending in the period 2022-2030 is about $71 billion (2011$), or $76 billion (2015$).[18] This excludes spending on allowance purchases.[19] If companies have to purchase allowances, these costs should be reported as expenditures the electricity sector will incur to comply. However, the RIA is presenting estimates of electricity sector compliance expenditures excluding allowance spending as a "proxy" for societal costs.[20] The RIA needs to rely on a crude proxy estimate such as this because EPA has not performed a proper estimate of net societal costs using a macroeconomic model. As I have explained above, NERA has performed a proper macroeconomic analysis to assess net societal costs of the CPP. NERA's estimate of the present value of net societal costs of the CPP (excluding allowance costs) is $64 billion to $79 billion (2015$) for a mass-based approach. This is remarkably similar to EPA's $76 billion (2015$) present value "proxy" estimate. Thus, an "apples-to-apples" comparison shows that NERA's economic impact estimates are actually in the same ballpark as EPA's, once the flaws in EPA's reporting of its own cost estimates are corrected and more comparable concepts of policy cost are compared.

[18] This calculation is also documented in the spreadsheet in Attachment B of this testimony.

[19] EPA has assumed that 100% of the allowances are allocated to the electricity sector for free (RIA, p. 3-36). However, I have heard of criticism of NERA's estimates of electricity sector expenditures for including the cost of allowances; but this criticism is without merit. Although these costs are not net societal costs—and are not treated as such in NERA's analysis and reporting of social cost impacts—the costs to purchase allowances at auction do represent costs of the electricity system that do affect electricity rates. As I have discussed, NERA considered two cases with different levels of assumed allocation of free allocation that lead to different electricity rate impacts, and thus different distributional impacts.

[20] RIA, p. ES-10.

Note that NERA's estimates of changes in energy *expenditures* are outputs of the same integrated macroeconomic modeling runs that produced our estimates of net societal cost and thus are fully consistent with our societal cost estimates. The larger expenditure impacts are also relevant to an evaluation of the CPP because they reflect the potential *distributional* impacts of compliance with the CPP. Both distributional impacts and net societal costs of a policy are relevant to policy makers. In contrast to NERA's set of reported impact measures, the cost tables in EPA's RIA are unhelpful because they do not report information on properly-estimated net societal costs, nor indicate distributional impacts.

Proper Comparisons of Costs and Benefits

NERA's objective was to assess the types of energy sector shifts that are likely to be necessary to comply with the CPP limits, and their associated costs at a macroeconomic level. This objective is in the domain of economic impact analysis, which provides one of the inputs to a benefit-cost comparison. As I have explained above, EPA has understated its own cost estimates in its comparison of costs to projected benefits of the CPP in the RIA. EPA also makes misleading public statements about the benefits of the CPP. For example, in its press release for the final CPP rule, EPA stated:

> *By 2030, the plan will cut carbon pollution from the power sector by nearly a third and additional reductions will come from pollutants that can create dangerous soot and smog, translating to significant health benefits for the American people. ... Americans will avoid up to 90,000 asthma attacks and spend up to 300,000 more days in the office or the classroom, instead of sick at home. And up to 3,600 families will be spared the grief of losing a loved one too soon.*[21]

21 EPA, "Obama Administration Takes Historic Action on Climate Change/Clean Power Plan to Protect Public Health, Spur Clean Energy Investments and Strengthen U.S. Leadership." Press release, August

In fact, none of those projected asthma attacks, sick days or 3,600 "premature deaths" has any relationship to climate change. They are entirely based on projected changes in emissions other than greenhouse gases—emissions that are reduced coincidentally as the result of the actions to reduce CO_2 emissions. These gains are called "co-benefits." Not only do these estimates have nothing to do with avoidance or mitigation of climate change, but the health effects that may occur from these other types of emissions are already stringently regulated to non-dangerous levels under other provisions of the Clean Air Act. Indeed, if EPA considered the health risks on which its co-benefits estimates are made as manifest, EPA would be required to eliminate them as a matter of long-established law.

The public deserves both a proper assessment of the true costs of the CPP and a clear comparison of those costs to its climate-related benefits. I hope that this testimony has provided an understanding of the true nature of the potential societal costs and impacts of the CPP—important components of any valid benefit-cost analysis.

Thank you for the opportunity to testify. I am attaching and entering into the record a full copy of the NERA analysis of CPP costs and impacts that I have summarized and discussed in the above written testimony.

3, 2015. (http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/c5df9981993c6df785257e96004d4f14!OpenDocument).

ATTACHMENT A
TO NOVEMBER 18, 2015 TESTIMONY
OF DR. ANNE E. SMITH

Copy of *Energy and Consumer Impacts of EPA's Clean Power Plan*, by NERA Economic Consulting, November 7, 2015.

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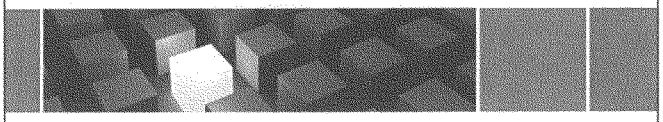

Energy and Consumer Impacts of EPA's Clean Power Plan

Prepared for the American Coalition for Clean Coal Electricity

November 7, 2015

Insight in Economics®

Contents

November 7, 2015

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Executive Summary

2

NERA Approach to Analyzing the Final Clean Power Plan

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- NERA used a state-of-the-art energy/economy model (N_{ew}ERA) to assess the impacts of the CPP
  - Impacts are measured relative to projected baseline conditions (i.e., without CPP)
  - Baseline values for this analysis, including electricity demand and supply, capital costs, and fuel costs, are based on the *AEO 2015* reference case projections
- NERA analyzed two alternative scenarios for mass-based CPP compliance, differing in the extent of trading each assumes (state versus regional)*
  - Both scenarios identify least cost compliance from all available options within the assumed trading regions, including end-use energy efficiency
  - Results for both are presented for two cases on whether or not some of the value of allowances is used to lower electricity rate impacts

	Scenario	Trading
1	Mass-Based	Intra-State
2	Mass-Based with Regional Trading	Regional

(*) Appendix 2 provides results for a rate-based scenario

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3

Scenarios Include Two Assumed Cases for Allocating the Value of Allowances

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- Two mass-based modeling scenarios present a range based on two assumptions on allocation of allowance value to electric local distribution companies (LDCs), which would reduce electricity system costs and thus retail electricity rates
  - **No LDC allocation:** Allowances are auctioned to generators with none of the proceeds distributed to LDCs, and thus electricity price impacts are not reduced
  - **50% LDC allocation**: Half of allowances are auctioned to generators, with the other half freely distributed to LDCs and used as credit to retail rates
- LDCs set regulated retail electricity rates on the basis of net costs, including any allowance allocation value that is provided
  - Thus LDCs "pass on" allowance value to electricity customers in the form of lower rates
  - In cost-of-service jurisdictions, providing "free" allowances to generators would have the same effect on electricity rates
- Note that in both cases the full value of allowances is returned to state households
  - **No LDC allocation:** All value provided to all households via means other than lowering electricity rate impacts
  - **50% LDC allocation:** Half the value provided to households via means other than lowering electricity rates, and the other half of the value is provided to LDCs and thus to electricity consumers in the form of lower electricity rate impacts

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Key Findings

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- All compliance scenarios lead to large reductions in average CO_2 emissions
  - Reductions range from 19% to 21% (relative to baseline emissions)
  - By 2031, annual emissions are 36% to 37% lower than they were in 2005
- Energy sector expenditure increases range from $220 to $292 billion (spending from 2022 through 2033, brought to a present value in 2016)
  - Annual average expenditures increases between $29 and $39 billion/year
  - Expenditures include changes in electricity generation costs (including allowance costs), energy efficiency costs, and increased natural gas costs for non-electric consumers
  - Expenditures do not include potential increased costs for electricity transmission and distribution and natural gas infrastructure
- Average annual U.S. retail electricity rate increases range from 11%/year to 14%/year (relative to baseline) over the same time period
- For the overall economy, losses to U.S. consumers range from $64 billion to $79 billion on a present value basis over the same time period

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Energy Sector Impacts

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Key Energy Impacts of Compliance Scenarios (2022-2033, 2015$)

	Present Value of Expenditures	Annual Average Expenditures	Retail Electricity Rate	Henry Hub Natural Gas Price	Total CO_2 Emissions
	PV billion$	Annual avg billion$	¢/kWh	$/MMBtu	Annual avg MM metric tons
Baseline	$2,143	$333	11.1	$5.7	2,038
Mass-Based	$2,384 to $2,436	$364 to $372	12.3 to 12.6	$5.7 to $5.8	1,610 to 1,613
Change	+$241 to +$292	+$32 to +$39	+1.2 to +1.6	+$0.0 to +$0.0	(428) to (425)
% Change	+11% to +14%	+10% to +12%	+11% to +14%	+0% to +1%	-21% to -21%
Mass-Based with Regional Trading	$2,364 to $2,408	$362 to $368	12.3 to 12.6	$5.7 to $5.7	1,637 to 1,641
Change	+$220 to +$264	+$29 to +$35	+1.2 to +1.5	(0.1) to (0.0)	(400) to (396)
% Change	+10% to +12%	+9% to +11%	+11% to +14%	-1% to -1%	-20% to -19%

Source: N_{ew}ERA modeling results.
Note: Present value is from 2022 through 2033, taken in 2016 using a 5% real discount rate. Annual averages and retail electricity rates are averages over the same period. Dollars in constant 2015 dollars. The ranges on results for each alternative trading scenario reflect the proportion of allowances freely allocated to LDCs, which varies from no LDC allocation to 50% LDC allocation. By 2031, annual CO_2 emissions are 36% to 37% lower than they were in 2005.

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State Electricity Price Impacts

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- Retail electricity prices were modeled from 2022-2033 (four model years) using N_{ew}ERA output and other information that contributes to estimating cost-of-service and competitive pricing
- State-level average electricity price increases demonstrate that many states could experience significant price increases relative to the baseline
  - 40 states could have average retail electricity price increases of 10% or more
  - 17 states could have average retail electricity price increases of 20% or more
  - 10 states could have average retail electricity price increases of 30% or more
- The highest annual increase in retail rates relative to the baseline also shows that many states could experience periods of significant price increases
  - 41 states could have "peak" retail electricity price increases of 10% or more
  - 28 states could have "peak" retail electricity price increases of 20% or more
  - 7 states could have "peak" retail electricity price increases of 40% or more

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State Electricity Price Impacts

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State-Level Electricity Price Increases (Relative to Baseline Prices)

	Number of States With Average Rate Increases			Number of States With "Peak" Model Year Rate Increases			
Scenario	≥ 10%	≥ 20%	≥ 30%	≥ 10%	≥ 20%	≥ 30%	≥ 40%
Mass-Based							
No Allocation	37	16	9	41	24	12	3
50% Allocation	30	6	1	36	14	3	0
Mass-Based with Regional Trading							
No Allocation	37	14	4	41	25	10	7
50% Allocation	31	8	0	37	15	6	2
Across Any Scenario	40	17	10	41	28	14	7

Notes: Retail electricity prices were modeled from 2022-2033 using NewERA output and other information that contributes to estimating cost-of-service and competitive pricing. The average rate increase is calculated at the state-level by comparing the price under the policy to the price in the baseline. The "peak" rate increase is calculated at the state-level by comparing, across model years, the percent increase in the price under the policy relative to the baseline price during that model year. The highest percent increase across all model years is the "peak" price increase. Results across any scenario include the four scenario/case combinations above.

The CPP could potentially generate significant average and "peak" retail electricity rate increases, with most states experiencing double-digit increases

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Impacts to U.S. Consumers

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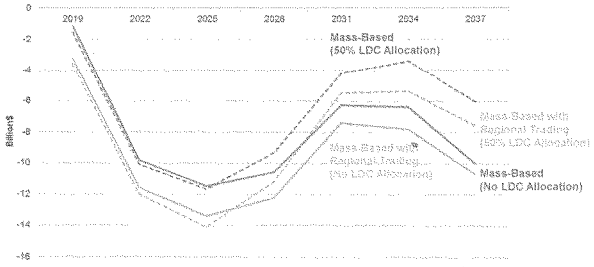
Differences in Total U.S. Consumption (2015$)



Source: N_{ew}ERA modeling results, relative to baseline.
Notes: Net effects on U.S. spending power, including return to households of full value of allowances, either all through means other than lower electric rates (no allocation case) or half through reductions in electricity rates and half through another means (50% LDC allocation case).

Present value of total consumption loss—reflecting reduced economic well-being—over the period from 2022 to 2033 ranges from $64B to $79B

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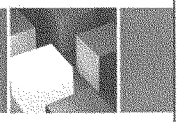

Overview of Clean Power Plan

Overview of CPP

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- The CPP aims to reduce CO_2 emissions from existing fossil-fueled power plants
- The CPP establishes interim (2022-2029) and final (2030) statewide goals in three forms:
  - Mass-based state goal measured in total short tons
  - Mass-based state goal with a new source complement measured in total short tons
  - Rate-based state goal measured in pounds per megawatt hour (lb/MWh)
- States have responsibility to implement plans to ensure that power plants in their states (individually or in combination with other measures) achieve the interim performance rates over 2022-2029 and the final goals by 2030
- States have the option to work with other states on multi-state approaches, including emissions trading

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Basic Elements of the CPP

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	Final Rule
Program Timing	Starts in 2022 with "glide path" to final standards in 2030
Bases for Setting State Limits	State-specific emissions rates based on EPA's estimates of three "building block" options (increases in plant efficiency, natural gas & renewables). Emission rate limits converted to equivalent mass caps if states choose that compliance scenario.
Bases for State Compliance	Although not a "building block" for calculating state emissions limits, end-use energy efficiency can be used in state compliance plans
Trading Mechanisms	Intra-state trading and well as inter-state trading
Deadline for State Implementation Plan	September 2018, after initial submittal by September 2016
Federal Plan	EPA authorized to promulgate federal implementation plan if a state fails to submit a plan or submits a plan that does not comply.

Source: EPA (2015). *Overview of the Clean Power Plan.*
http://www2.epa.gov/sites/production/files/2015-08/documents/fs-cpp-overview.pdf.

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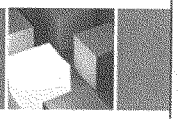

NERA Methodology

Analysis Uses NERA's N_{ew}ERA Model

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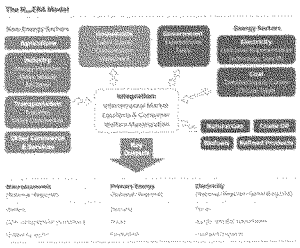
- N_{ew}ERA combines a bottom-up electricity sector model with a top-down model of the full U.S. (macro)economy
  - Electricity sector model optimizes compliance with CPP and estimates electricity rate impacts and other system operational changes such as natural gas and coal usage
  - Macroeconomic model incorporates demand response to electricity price changes, and natural gas and coal price responses to changes in fuel usage
- Economic impact analysis thus offers a comprehensive understanding of not just electricity sector compliance but also overall impacts on consumer spending power
- Appendix 1 provides more details on the N_{ew}ERA model



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NERA Baseline

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- N_{ew}ERA model and its baseline projections are calibrated to the Department of Energy's *AEO 2015* reference case
  - Power plant retirements were updated based on public announcements of firm closures as of August 2015
- Baseline includes effects of existing environmental regulations, including RGGI and California AB 32
  - Baseline does not reflect the possibilities of proposed or future regulations (similar to AEO methodology)
- Baseline does not include the additional end-use energy efficiency that EPA assumes is available for CPP compliance
  - Exception is that NERA assumes California adopts end-use energy efficiency as part of its compliance with the AB 32 program, and thus these costs and demand effects are assumed to be in the baseline

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NERA CPP Compliance Scenarios

1. Mass-Based
   - State compliance with emissions targets (includes new sources)
   - Intra-state trading (least-cost compliance)
   - Range based on two assumed allowance allocations to LDCs
2. Mass-Based with Regional Trading
   - Same as Mass-Based except six trading regions
   - Regional boundaries same as EPA used in its draft Regulatory Impact Analysis (See Slide 32)
   - Range based on two assumed allowance allocations to LDCs

NERA Assumptions Related to CPP Compliance Options

1. **Coal Efficiency Retrofits**
   - EPA assumptions on the cost and effectiveness of coal heat rate improvements (4.3% for the Eastern Interconnection, 2.1% for the Western Interconnection, and 2.3% for the Texas Interconnection)
   - Units undertaking unit efficiency improvements are subject to New Source Review
2. **Natural Gas Generation**
   - Natural gas generation based upon least-cost generation mix using *AEO 2015* information on fuel prices and costs for alternative generation
3. **Renewable Generation**
   - Renewable generation based on least-cost generation mix using *AEO 2015* information on fuel prices and costs for alternative generation
4. **Energy Efficiency**
   - Use EPA assumption on initial cost ($1,100/MWh), which NERA applies to all energy efficiency programs (split 50/50 between utilities and consumers)
   - Use EPA assumptions on total potential for energy efficiency in each state

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Detailed Results: Mass-Based Scenario with Intra-State Trading Only

Impacts on U.S. Energy Markets: Mass-Based Scenario

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Annual Averages, 2022-2033

	Total Coal Retirements Through 2033	Coal-Fired Generation	Natural Gas-Fired Generation	Total Generation	Delivered Electricity Price
	GW	TWh	TWh	TWh	2015 ¢/kWh
Baseline	38	1,687	1,118	4,354	11.1
No LDC Allocation	85	1,254	1,121	3,919	12.6
Change	+47	(434)	+3	(435)	+1.6
% Change	+119%	-26%	+0%	-10%	+14%
50% LDC Allocation	82	1,249	1,141	3,945	12.3
Change	+45	(438)	+23	(408)	+1.2
% Change	+118%	-26%	+2%	-9%	+11%

Note: Coal retirements are cumulative from 2016-2033, with percentage change relative to baseline 2033 capacity. Other columns show annual average from 2022-2033. Natural gas-fired generation includes only existing and new combined cycle generation.

Mass-based CPP scenario leads to substantial changes in the U.S. energy system, including reductions in electricity generation and increases in electricity rates

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U.S. Energy Sector Expenditure Impacts: Mass-Based Scenario

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Changes in Energy Sector Expenditures (2015$)

	No LDC Allocation	*50% LDC Allocation*
Present Value (Billion 2015$)		
Cost of Electricity, Excluding EE	($128)	($111)
Cost of Energy Efficiency	$268	$268
Cost of Non-Electricity Natural Gas	$1	$3
Cost of Allowances	$152	$80
Total Expenditures	$292	$241

Note: Present value is from 2022 through 2033, taken in 2016 using a 5% real discount rate. Note that energy efficiency costs reflect the combined costs to utilities and consumers. Costs do not include any additional transmission and distribution expenditures or any increased natural gas infrastructure costs. All costs are presented relative to the baseline.

Mass-based CPP scenario leads to large increases in energy sector expenditures, reflecting substantial increases in costs for energy efficiency and allowances (particularly with no LDC allocation) that exceed savings from a smaller electricity system

Other Energy and Consumer Impacts: Mass-Based Scenario

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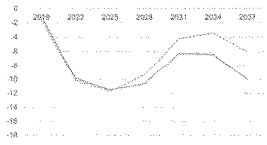
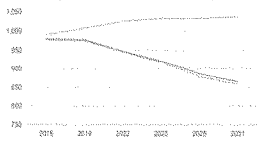
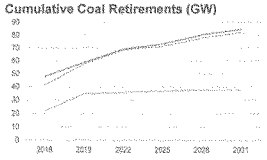
Differences in Total U.S. Consumption (Billion 2015$)*



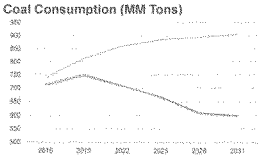
Electricity Sector Emissions Rate (lbs/MWh)



Cumulative Coal Retirements (GW)



Coal Consumption (MM Tons)



50% LDC Allocation — No LDC Allocation — Baseline

Source: NERA modeling results. Reported each model year (every three years).
* Consumption impacts are provided relative to Baseline scenario.

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Detailed Results: Mass-Based Scenario with Regional Trading

Impacts on U.S. Energy Markets: Mass-Based with Regional Trading Scenario

NERA
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Annual Averages, 2022-2033

	Total Coal Retirements Through 2033	Coal-Fired Generation	Natural Gas-Fired Generation	Total Generation	Delivered Electricity Price
	GW	TWh	TWh	TWh	2015 ¢/kWh
Baseline	38	1,687	1,118	4,354	11.1
No LDC Allocation	82	1,298	1,065	3,911	12.6
Change	+45	(389)	(53)	(443)	+1.5
% Change	+118%	-23%	-5%	-10%	14%
50% LDC Allocation	78	1,293	1,086	3,937	12.3
Change	+41	(394)	(32)	(416)	+1.2
% Change	+17%	-23%	-3%	-10%	+11%

Note: Coal retirements are cumulative from 2016-2033, with percentage change relative to baseline 2033 capacity. Other columns show annual average from 2022-2033. Natural gas-fired generation includes only existing and new combined cycle generation.

Mass-based with regional trading CPP scenario leads to substantial changes in the U.S. energy system, including reductions in electricity generation and increases in electricity rates

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U.S. Energy Sector Expenditure Impacts: Mass-Based with Regional Trading Scenario

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Changes in Energy Sector Expenditures (2015$)

	No LDC Allocation	*50% LDC Allocation*
Present Value (Billion 2015$)		
Cost of Electricity, Excluding EE	($142)	($122)
Cost of Energy Efficiency	$268	$268
Cost of Non-Electricity Natural Gas	($4)	($2)
Cost of Allowances	$142	$76
Total Expenditures	$264	$220

Note: Present value is from 2022 through 2033, taken in 2016 using a 5% real discount rate. Note that energy efficiency costs reflect the combined costs to utilities and consumers. Costs do not include any additional transmission and distribution expenditures or any increased natural gas infrastructure costs . All costs are presented relative to the baseline.

Mass-based with regional trading CPP scenario leads to large increases in energy sector expenditures, reflecting substantial increases in costs for energy efficiency and allowances (particularly with no LDC allocation) that exceed savings from a smaller electricity system

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Impacts to U.S. Consumers: Mass-Based with Regional Trading Scenario

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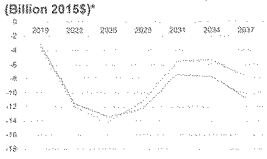
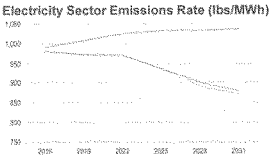
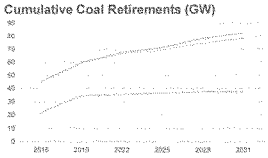
Differences in Total U.S. Consumption (Billion 2015$)*



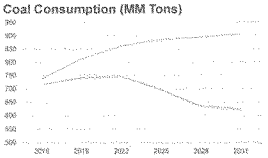
Electricity Sector Emissions Rate (lbs/MWh)



Cumulative Coal Retirements (GW)



Coal Consumption (MM Tons)



50% LDC Allocation — No LDC Allocation — Baseline

Source: NERA modeling results. Reported each model year (every three years).
* Relative to baseline consumption

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Appendix 1: Overview of N_{ew}ERA Model

N_{ew}ERA Model

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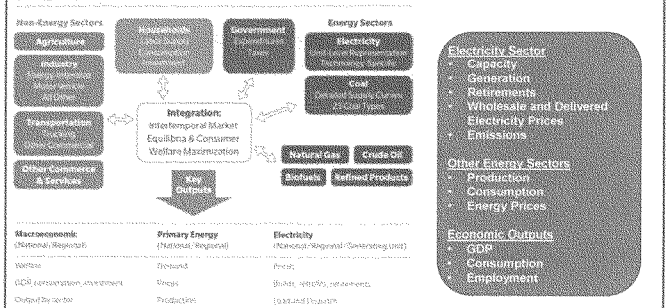
N_{ew}ERA Model Structure



N_{ew}ERA Electricity Sector Model: Overview

NERA

- Bottom-up dispatch and capacity planning model
  - Unit-level information on generating units in 34 U.S. regions
  - Detailed coal supply curves by coal type
  - Regional electricity demand and capacity requirements
- Least-cost projection of market activity
  - Satisfies demand and all other constraints over model time horizon
  - Projects unit-level generation and investment decisions and regional fuel and electricity prices
- Data sources
  - Model calibrated to U.S. Energy Information Administration's *AEO 2015*
  - Other electricity sector data from EIA, EPA, NERC, NREL, NETL, Ventyx Velocity Suite, and HellerWorx

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N_{ew}ERA Electricity Sector Model: Unit-Level Detail

NERA

- Represents electricity capacity and generation at the unit level
  - 16 generating technologies, including renewables
  - Unit physical attributes: capacity, utilization, heat rate, outages, retrofits, emission rate
  - Unit costs: capital, fixed O&M, variable O&M, transmission and distribution, refurbishment
- Projects unit generation and investment decisions to minimize sector costs over projection period
  - Available actions include retirements, new builds, retrofits, coal type choice (for coal units), and fuel switching
  - Units will retire if they cannot remain profitable
  - Units can also be forced to take certain actions at specified times, or given a choice to act or retire

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NewERA Electricity Sector Model: Fuel Supply

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- Model represents supply of five fuels: coal, natural gas, oil, biomass, and uranium
- Detailed supply curves for 23 coal types
  - At each "step" on supply curve, provides price, annual production limit, and total coal reserves available at that price
  - Transportation matrix determines coals that can be delivered to each unit and the cost of delivery
  - Coal units assigned an initial coal type, but can incur a capital costs to switch to other coal types when reasonable

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NewERA Electricity Sector Model: Electricity Demand

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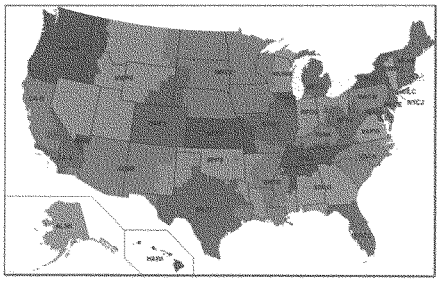

- Demand by region for 34 U.S. regions
- 25 electricity demand "load blocks"
  - Ten in summer and five each in winter, spring, and fall
  - Reflects peak vs. off-peak demand in each season
- Regional "reserve margins" based on peak demand
  - Regions required to have capacity in excess of peak demand for system reliability

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NewERA Electricity Sector Model: Regional Emission Trading Regions

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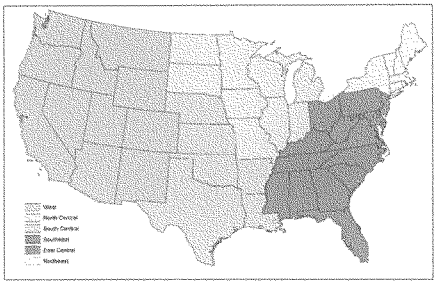

- Regions for the mass-based scenario with regional trading are based on the six regions developed by EPA in its RIA for the proposed Clean Power Plan

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NewERA Electricity Sector Model: Model Solution

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- Model is required to meet many electricity market and regulatory constraints
  - Regional demand, reserve capacity requirements, fuel availability, forced retrofits, RPS or emissions regulations
  - Flexible to a variety of user-specified constraints, from unit-specific actions to market-wide regulations
- Finds the least-cost way to satisfy all constraints
  - Uses perfect foresight of market conditions
  - Chooses investments and operation of units to minimize present value of costs over the entire model period

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N_{ew}ERA Electricity Sector Model: Model Outputs

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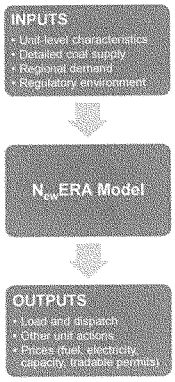
- Model period 2016 – 2037 with outputs for every 3rd year (flexible to user specification)
- Unit-level and regional activity
  - Generation, investments in retrofits or capacity, retirements, operational costs, and revenues from generating and capacity services
- Regional prices
  - Minemouth and delivered coal, non-coal fuels, wholesale electricity, capacity, renewable energy credits, and emissions credit where applicable
  - Separate cost-of-service calculation reflects delivered prices in regulated jurisdictions



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The Comprehensiveness and Flexibility of the N_{ew}ERA Model is Well Suited to Modeling the CPP

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- N_{ew}ERA models CO_2 emission rates or mass-based caps at national, regional, state, or other aggregation level, accounting for changes in standards over time
- Includes an option for coal efficiency "upgrades"
  - The cost and availability can be varied by unit
- Models end-use energy efficiency as an economic decision within the model
  - Cost and availability of end-use energy efficiency are among the most significant modeling uncertainties
- Includes full suite of state options for new renewables
- Captures expected changes in natural gas prices based on changes in demand from the electricity sector
- Although this study has made simplifying alternative assumptions regarding state implementation of the CPP, N_{ew}ERA can be used to develop estimates for specific implementation plans for individual states

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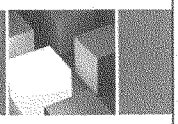

Appendix 2: Detailed Results for Rate-Based Scenario

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Energy Sector Impacts: Rate-Based Scenario

Key Energy Impacts of Compliance (2022-2033, 2015$)

	Present Value of Expenditures	Annual Average Expenditures	Retail Electricity Rate	Henry Hub Natural Gas Price	Total CO_2 Emissions
	PV billion$	Annual avg billion$	¢/kWh	$/MMBtu	Annual avg MM metric tons
Baseline	$2,143	$333	11.1	$5.7	2,038
Rate-Based	$2,336	$358	12.1	$6.0	1,503
Change	+$192	+$25	+1.1	+$0.2	(535)
% Change	+9%	+7%	+10%	+4%	-26%

Source: N_{ew}ERA modeling results.
Note: Present value is from 2022 through 2033, taken in 2016 using a 5% real discount rate. Annual averages and retail electricity rates are averages over the same period. Dollars in constant 2015 dollars. By 2031, annual CO_2 emissions are 41% lower than they were in 2005.

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Impacts on U.S. Energy Markets: Rate-Based Scenario

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Annual Averages, 2022-2033

	Total Coal Retirements Through 2033	Coal-Fired Generation	Natural Gas-Fired Generation	Total Generation	Delivered Electricity Price
	GW	TWh	TWh	TWh	2015 ¢/kWh
Baseline	38	1,687	1,118	4,354	11.1
Rate-Based	79	1,071	1,302	3,966	12.1
Change	+41	(616)	+184	(387)	+1.1
% Change	+17%	-37%	+16%	-9%	+10%

Note: Coal retirements are cumulative from 2016-2033, with percentage change relative to baseline 2033 capacity. Other columns show annual average from 2022-2033. Natural gas-fired generation includes only existing and new combined cycle generation.

CPP leads to major changes in the U.S. energy system under rate-based compliance scenario

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U.S. Energy Sector Expenditure Impacts: Rate-Based Scenario

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Changes in Energy Sector Expenditures (2015$)

	Rate-Based
Present Value (Billion 2015$)	
Cost of Electricity, Excluding EE	($95)
Cost of Energy Efficiency	$268
Cost of Non-Electricity Natural Gas	$19
Cost of Allowances	$0
Total Expenditures	$192

Note: Present value is from 2022 through 2033, taken in 2016 using a 5% real discount rate. Note that energy efficiency costs reflect the combined costs to utilities and consumers. All costs are presented relative to the baseline.

CPP leads to large expenditures for energy efficiency that overwhelm savings from a smaller electricity system

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Impacts to U.S. Consumers: Rate-Based Scenario

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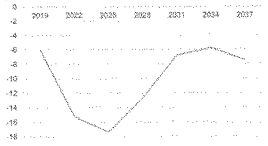
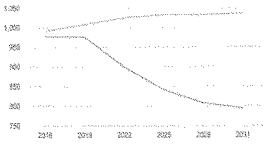
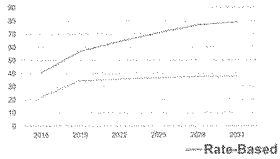
Differences in Total U.S. Consumption (Billion 2015$)*



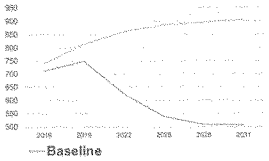
Electricity Sector Emissions Rate (lbs/MWh)



Cumulative Coal Retirements (GW)



Coal Consumption (MM Tons)



Rate-Based Baseline

Source: NERA modeling results. Reported each model year (every three years) relative to baseline consumption.
* Consumption impacts are provided relative to Baseline scenario.

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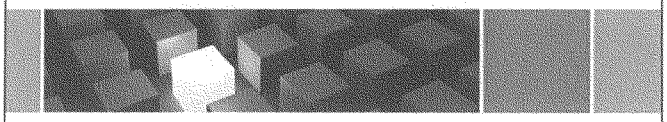

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ATTACHMENT B
TO NOVEMBER 18, 2015 TESTIMONY
OF DR. ANNE E. SMITH

Copy of spreadsheet documenting NERA's correction to EPA's calculations of annual costs of CPP compliance in the CPP RIA, and associated present value.

Replication and Correction of EPA's Compliance Costs
Billions of 2011$

REPLICATION

	2016	2018	2020	2025	2030	2040	2050
Mass-Based Costs	$145.8	$155.6	$165.7	$164.6	$180.1	$191.8	$223.7
Base Case Costs	$146.5	$156.4	$166.5	$178.3	$201.3	$219.4	$258.8
Delta	-$0.7	-$0.8	-$0.8	-$13.7	-$21.2	-$27.6	-$35.1
Annualized EE Costs	$0.0	$0.0	$2.1	$16.7	$26.3	$31.0	$32.9
Total Policy Cost	-$0.7	-$0.8	$1.4	$3.0	$5.1	$3.3	-$2.2
Per RIA Table ES-5			***$1.4***	***$3.0***	***$5.1***		

Annual Costs w/ Annualized Energy Efficiency Costs

Model Year Mapping		2016	2016	2018	2020	2020	2020	2020	2025	2025	2025	2025	2025	2030	2030	2030	2030	2030	2030
Actual Year		**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Mass-Based Costs		$146	$146	$156	$166	$165.7	$166	$166	$165	$165	$164.6	$165	$165	$180	$180	$180.1	$180	$180	$180
Base Case Costs		$146	$146	$156	$166	$166.5	$166	$166	$178	$178	$178.3	$178	$178	$201	$201	$201.3	$201	$201	$201
Delta		-$1	-$1	-$1	-$1	-$0.8	-$1	-$1	-$14	-$14	-$13.7	-$14	-$14	-$21	-$21	-$21.2	-$21	-$21	-$21
Annualized EE Costs		$0	$0	$0	$0	$2.1	$5	$8	$11	$14	$16.7	$19	$21	$24	$25	$26.3	$27	$28	$29
Total Policy Cost		-$1	-$1	-$1	-$1	**$1.4**	$4	$7	-$3	$0	**$3.0**	$6	$8	$2	$4	**$5.1**	$6	$7	$8

CORRECTION

Annual Costs w/ First-Year Energy Efficiency Costs

Model Year Mapping		2016	2016	2018	2020	2020	2020	2020	2025	2025	2025	2025	2025	2030	2030	2030	2030	2030	2030
Actual Year	**Present Value (2022-2033)**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**
Mass-Based Costs	$1,219	$146	$146	$156	$166	$165.7	$166	$166	$165	$165	$164.6	$165	$165	$180	$180	$180.1	$180	$180	$180
Base Case Costs	$1,330	$146	$146	$156	$166	$166.5	$166	$166	$178	$178	$178.3	$178	$178	$201	$201	$201.3	$201	$201	$201
Delta	-$111	-$1	-$1	-$1	-$1	-$0.8	-$1	-$1	-$14	-$14	-$13.7	-$14	-$14	-$21	-$21	-$21.2	-$21	-$21	-$21
First-Year EE Costs	$181	$0	$0	$0	$0	$18.1	$22	$24	$26	$27	$25.4	$25	$25	$25	$25	$25.3	$25	$26	$26
Total Policy Cost (2011$)	**$71**	-$1	-$1	-$1	-$1	**$17.4**	$21	$24	$12	$14	**$11.7**	$12	$12	$4	$4	**$4.1**	$4	$4	$4
2011$ to 2015$	*1.070*																		
Total Policy Cost (2015$)	**$76**																		

Sources:

Base Case Outputs	www2.epa.gov/sites/production/files/2015-08/base_case.zip (Base Case SSR.xlsx, Table 1-16_US worksheet, Table 15)
Mass-Based Case Outputs	www2.epa.gov/sites/production/files/2015-08/mass-based.zip (Mass-Based SSR.xlsx, Table 1-16_US worksheet, Table 15)
Energy Efficiency Costs	www3.epa.gov/airquality/cpp/df-cpp-demand-side-ee-at3.xlsx

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Senior Vice President

Dr. Anne Smith is an economist and decision analyst specializing in policy impact assessment, economic impact analysis, benefits analysis, and integrated assessment. Dr. Smith has conducted major analyses of costs, benefits, and macroeconomic impacts of many important environmental issues, including global climate change, air quality standards (*e.g.*, $PM_{2.5}$, ozone, mercury, visibility), contaminated site risk management, and food safety.

Since 1990, Dr. Smith has been continuously engaged as an expert in multiple different climate change policy analyses and proceedings, contributing in many aspects, including design of market-based control policies, integrated policy evaluation, multi-criteria policy evaluation, and benefit-cost analysis. She has released reports on the costs and economic impacts of every major U.S. climate policy legislative and regulatory proposal since 2003, including the USEPA's Clean Power Plan. She also is active in assessment and use of the "social cost of carbon." Another area of particular expertise for Dr. Smith has been assessing the market and business implications of alternative designs to regulate emissions, such as cap-and-trade and emissions taxes. She has prepared innovative analyses, published research papers, and submitted technical comments on these and many other aspects of climate change policy for energy and finance companies, research institutions, industry associations, non-profit organizations, and governments globally. Dr. Smith has been engaged as an expert witness in major litigation and has helped private corporations devise business strategies to address changing regulatory and business environments.

Dr. Smith has testified before numerous committees of the U.S. Congress, served on advisory committees, such as for the National Research Council, and on the Board of Directors of the Society for Benefit-Cost Analysis. Before joining NERA, Dr. Smith headed the Climate & Sustainability Group at Charles River Associates. Prior to that, she headed the Environmental Policy Practice and served on the Board of Directors at Decision Focus Incorporated, and earlier served as an economist in the Office of Policy Planning and Evaluation at the US Environmental Protection Agency. Dr. Smith received her BA degree in Economics from Duke University in 1977, *summa cum laude,* and is a member of Phi Beta Kappa. She received her MA and PhD degrees in Economics from Stanford University. Her PhD degree included a minor in Stanford's Engineering-Economic Systems Department (presently known as the Department of Management Sciences and Engineering).

Chairman SMITH. Thank you——
Dr. SMITH. Thank you.
Chairman SMITH. —Dr. Smith.
Mr. Magness.

**TESTIMONY OF MR. BILL MAGNESS,
SENIOR VICE PRESIDENT, GOVERNANCE,
RISK AND COMPLIANCE,
ELECTRIC RELIABILITY COUNCIL OF TEXAS**

Mr. MAGNESS. Thank you, Mr. Chairman, Ranking Member Esty, Members of the Committee. Thanks for the opportunity to appear before you today.

I'm Bill Magness. I'm the Senior Vice President for Governance, Risk, and Compliance and General Counsel at the Electric Reliability Council of Texas, known as ERCOT.

ERCOT's a nonprofit corporation that ensures a reliable electric grid and operates wholesale electricity markets for consumers in Texas. The ERCOT interconnection is comprised of approximately 75 percent of the landmass of Texas but includes about 90 percent of the customer demand in the State.

ERCOT recently completed a study of the impact of the Clean Power Plan on electric service in Texas within the ERCOT region. ERCOT's study looks at power supply impacts of the CPP, as well as the estimated cost to consumers. On the power supply side of the equation, we examine impacts in two broad areas: first, on power plants, where the power is made and transmitted through wires to the customers. ERCOT's power plant portfolio is diverse. Of the energy used in ERCOT in 2014, 41 percent of it came from natural gas units, 36 percent from coal units, 11 percent from nuclear, and ten percent from wind and other renewable resources.

The second area was the transmission system. This is a complex system of wires, towers, transformers, and associated infrastructure that carry electricity between power plants and to the local utilities for delivery to customers.

ERCOT manages the flow of electricity on 43,000 miles of electric transmission lines, including 3,600 miles that were very recently built primarily to bring wind resources to urban areas at a cost of approximately $6.9 billion.

On the consumer cost side, in ERCOT our customer base is also very diverse. On the hottest day in the summer ERCOT power demand comes from approximately 50 percent residential customers and then 25 percent small commercial customers and 25 percent large commercial and industrial customers. On a more mild day like today, ERCOT's demand comes from 40 percent—rather, 40 percent of the demand in ERCOT is for large commercial and industrial customers. This is because there is a large commercial and industrial base in our region, which continues to show growth, as well as population inflows continue to show growth in Texas. So we continue to have increased demand for electricity in the State.

When we reviewed cost to customers based on the CPP, we examined wholesale and retail costs that customers can expect to experience in the future. To summarize the findings, first, on the supply side, ERCOT expects at least 4,000 megawatts of coal-fired generation capacity to stop operating due to the Clean Power Plan.

That's roughly 25 percent of ERCOT's coal fleet, approximately six percent of our total generation capacity.

Compliance with the CPP would also require dramatic increase in reliance on renewable resources on the ERCOT grid. ERCOT and Texas are already number one in wind production in the United States and would rank sixth if Texas were measured against other nations. To put that growth in perspective, wind power generated 36 terawatt hours of electricity in ERCOT in 2014. That's with more wind production on our grid than exists in any other State. Our modeling shows the CPP requirements would demand that new renewables would be needed to produce 95 terawatts—terawatt hours by 2030, which would be a remarkable increase.

Now, ERCOT, because of the large amount of renewables on our system, has been a leader in the integration of renewable resources on electric grids, but the penetration rates contemplated by the CPP will pose challenges. In electric systems, supply and demand have to be perfectly balanced at all times within very small tolerances. Power supply that can be dispatched by operators, that can be controlled by operators, has traditionally provided a reliable way to keep frequency in balance. Power supply that cannot be dispatched must be operated in a different way and poses unique challenges that now exist on our grid and others.

Our studies show that, at times, it may be very difficult to meet the CPP's emissions targets while maintaining the amount of dispatchable power that we need to maintain reliability to keep things in balance.

On the transmission issues, the transmission system moves powers from power suppliers to consumers, but it also relies on injections of power to keep it stable. Our model results show overloads on hundreds of miles of transmission lines within ERCOT, and if we need to do transmission projects to remedy that, those projects cost between $1 million and $3 million per mile, and in ERCOT, take approximately five years from the beginning of planning to the completion of construction. So for large infrastructure projects that would be needed to address the retirement of power plants, there is a very long lead time and a lot of expense involved.

Finally, on the cost side, as noted, our study showed a 16 percent increase in compliance costs from Clean Power Plan, but that does not increase the additional infrastructure spending and transmission costs that I noted in the testimony. Thank you.

[The prepared statement of Mr. Magness follows:]

Testimony of Bill Magness
General Counsel and Sr. Vice President–Governance, Risk, and Compliance
Electric Reliability Council of Texas, Inc.

Before the
U.S. House of Representatives
Committee on Science, Space and Technology
November 18, 2015

Thank you for the opportunity to speak before the Committee today. My name is Bill Magness, and I am the General Counsel and Senior Vice President for Governance, Risk, and Compliance for the Electric Reliability Council of Texas, Inc. (ERCOT). ERCOT is the independent system operator (ISO) for the ERCOT Interconnection, which encompasses approximately 90% of electric load in Texas. ERCOT is the independent organization established by the Texas Legislature to be responsible for the reliable planning and operation of the electric grid for the ERCOT Interconnection. ERCOT also administers and maintains a forward-looking open market to provide affordable and reliable electricity to consumers in Texas. Existing market policies and investments in transmission in the ERCOT region have incentivized market participants to maximize the efficiency of the generation fleet and develop new technologies including renewable generation. With recent investments in transmission, more than 14 gigawatts of wind capacity have been successfully integrated into the ERCOT grid.

ERCOT recently released an analysis of the impacts of the Clean Power Plan (CPP) final rule on generation resources and grid reliability in the ERCOT Region, which I would like to share with you today. The analysis uses planning processes and methodologies consistent with ERCOT's Long-Term System Assessment studies. Based on this analysis, we see the potential for significant impacts on the planning and operation of the ERCOT grid resulting from compliance with the CPP.

The results indicate that the final CPP, by itself, will result in the retirement of at least 4,000 MW of coal generation capacity. This creates a risk that the ERCOT Region could see multiple unit retirements within a short timeframe, which could result in implications for reliability. When the impacts of the CPP are considered in combination with the requirements of EPA's proposed Regional Haze Federal Implementation Plan (FIP) for Texas, there are additional unit retirements, many of which occur even before the start of CPP compliance in 2022. The Regional Haze FIP was proposed by EPA in November 2014, and would require seven coal-fired units in Texas to upgrade their existing scrubbers and seven units (five of which are located in ERCOT) to install new scrubbers. If future unit retirements occur before the market has time to respond with new investment, there could be periods of reduced system-wide resource adequacy and an increased risk of system scarcity events.

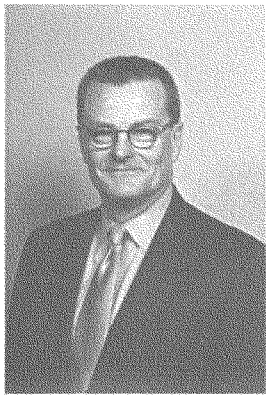
The retirement of legacy coal-fired generation could also result in localized reliability issues and require transmission system upgrades. A recent reliability analysis conducted by ERCOT of potential retirement scenarios resulting from compliance with the Regional Haze FIP requirements showed that the retirement of 4,200 MW of coal-fired capacity, comparable to the amount expected to retire due to the CPP alone, would have a significant impact on the reliability of the transmission system. Model results indicated power-flows exceeding the thermal capacities of 10 circuits (143 miles) of 345 kV transmission, 31 circuits (147 miles) of 138 kV transmission, 6 circuits (39 miles) of 69 kV transmission, and 11 transformers. As a general estimate, new 69 kV and 138 kV lines cost on the order of one million dollars per mile and new 345 kV lines cost on the order of three million dollars per mile. Additionally, in the ERCOT Region, it takes at least five years for a new major transmission project to be planned, routed, approved, and constructed.

The CPP study also predicts a sizeable amount of renewable capacity additions, due both to the improving economics of these technologies as well as the impacts of regulating CO_2 emissions. In 2014, 10.6% of the ERCOT Region's annual generation came from wind resources. At its highest levels of instantaneous penetration, wind has provided enough energy to serve 40.58% of system load. The modeling results predict further growth in both wind and solar resources. Under CPP compliance, intermittent renewable generation would constitute 27% of annual generation by 2030. In hourly operations, this level of renewables would result in intermittent generation serving more than 50% of load in over 400 hours of the year, and a peak instantaneous penetration of 67%. During these periods, the need to maintain operational reliability could require the curtailment of renewable generation resources, and delay achievement of compliance with the CPP limits.

As a specific example, wind production in West Texas often results in high renewable penetration during early morning hours, when customer demand for electricity is lowest. During these periods, non-intermittent (dispatchable) resources may need to stay online to provide electricity later in the morning when demand increases and wind production decreases. If generation from wind is sufficiently high during off-peak hours, the need to keep non-intermittent resources committed at minimum operating levels – where unit efficiencies are lower and CO_2 emissions rates are higher – can make it necessary to curtail some of the production from wind resources to keep generation output and customer demand in balance. Yet curtailing the wind resources may delay compliance with CPP emission limits. In this way, CPP compliance could place system reliability needs in opposition to emissions requirements in periods when generation from intermittent renewable resources serves a large percentage of customer demand.

The CPP will also result in increased wholesale and retail energy costs in the ERCOT Region. Based on ERCOT's analysis, energy costs for customers may increase by up to 16% by 2030 due to the CPP alone, without accounting for the associated costs of transmission upgrades, higher natural gas prices caused by increased gas demand, procurement of additional ancillary services, and other costs associated with the retirement or decreased operation of coal-fired capacity in the ERCOT Region. Consideration of these factors would result in even higher energy costs for customers.

Thank you for the opportunity to testify before this committee today. I would be happy to answer any questions you have about this study and the impacts of environmental regulations on grid reliability in the ERCOT Region.



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Bill Magness serves as General Counsel & Senior Vice-President of the Electric Reliability Council of Texas, Inc. (ERCOT).

Prior to joining ERCOT in 2010, Mr. Magness was with the law firm of Casey, Gentz & Magness, in Austin, Texas, where he represented ERCOT as outside counsel in numerous cases before the Public Utility Commission of Texas. For over twenty years, his law practice focused on electric and telecommunications utility matters. He served as lead counsel in cases before utility commissions in sixteen states and the U.S. Virgin Islands.

In addition, Mr. Magness also served as an Assistant United States Attorney and as chief of the Office of Customer Protection and chief counsel of Office of Policy Development at the Public Utility Commission of Texas.

Mr. Magness holds a bachelor's degree from the University of Texas at Austin and a J.D. from The University of Pennsylvania Law School.

Chairman SMITH. Thank you, Mr. Magness.
And, Ms. Dykes.

**TESTIMONY OF MS. KATIE DYKES,
DEPUTY COMMISSIONER,
CONNECTICUT DEPARTMENT OF ENERGY AND
ENVIRONMENTAL PROTECTION AND CHAIR,
REGIONAL GREENHOUSE GAS INITIATIVE, INC.**

Ms. DYKES. Thank you, Chairman Smith and Ranking Member Esty and other Members of the Committee, for inviting me to testify today.

Climate change threatens Connecticut's energy system, its families, and its businesses, and I am proud to be here to tell you that our State has made a commitment to combat climate change and to share with you some of the successes that we've already achieved in our State in doing so.

We know that a well-designed program can achieve cost-effective pollution reduction while supporting local economies. We know this because the Regional Greenhouse Gas Initiative, or RGGI, has proven it. The RGGI States have demonstrated the successful reduction of carbon pollution while maintaining grid reliability, creating jobs, and reinvesting in strategic energy and consumer benefit programs.

As a RGGI State, Connecticut stands with nine other—or eight other States in New England and the mid-Atlantic region, representing 16 percent of the U.S. economy and $2.4 trillion in gross domestic product. Together, through our commitments to the RGGI program, we've achieved already the goals that the Clean Power Plan is setting out to put us on track to achieve thanks to the early adoption of climate change mitigation policies, investment in energy efficiency, and our leadership in the transition to a clean energy economy. We do not anticipate any difficulty in meeting the Clean Power Plan compliance timelines.

Over the last decade, carbon pollution in the RGGI region has decreased by over 40 percent, while our regional economy has grown by eight percent. And during that time, we've maintained reliability, increased employment, and made a transition to a clean energy economy.

Independent reports by the Analysis Group have concluded that RGGI has created billions of dollars of net economic value for families and businesses in our region and created tens of thousands of new job-years in our member States. Investments funded by RGGI proceeds are advancing grid reliability goals in the region through energy efficiency, peak demand reduction, and other strategic programs.

Experts agree that multistate programs such as RGGI are the most cost-effective way to achieve Clean Power Plan targets. Multistate programs aligned with the regional nature of the grid, they allow for a simple, transparent, and verifiable tracking and compliance system, and they foster regional cooperation.

The Clean Power Plan supports multistate cooperation as a compliance pathway, and I'm really proud to be here and excited to share with you some of the lessons that we've learned in imple-

menting this program over the past several years, which we know has generated a lot of interest from other States and also from compliance entities as a model for States to pursue—to assist them in achieving very highly cost-effective compliance with the Clean Power Plan. I look forward to talking with you about that today.

[The prepared statement of Ms. Dykes follows:]

Testimony of

Katie Dykes
Deputy Commissioner for Energy,
Connecticut Department for Energy and Environmental Protection
Chair, Regional Greenhouse Gas Initiative, Inc. Board of Directors

November 18, 2015

Before the House of Representatives Committee on Science, Space, and Technology

Thank you Chairman Smith, Ranking Member Johnson, and other members of the committee for inviting me to testify this morning. As Deputy Commissioner for Energy at the Connecticut Department of Energy and Environmental Protection, and as the Chair of the Regional Greenhouse Gas Initiative (RGGI), Inc. Board of Directors, I appreciate the opportunity to provide testimony on such an important topic. With a major international meeting on climate change happening soon in Paris, the world's attention is on the United States as we implement our own policies to reduce carbon pollution. In particular, there is considerable focus on the EPA's Clean Power Plan (CPP).

Many states, including Connecticut, have set a positive national example in advance of the CPP. Connecticut is one of nine states participating in RGGI – a market-based, mass-based multi-state program to reduce carbon pollution from the power sector. In addition to my State, the other RGGI participating states include Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Together, our states have a seven-year track record of successfully implementing the nation's first market-based program to reduce carbon pollution in the electric sector.

The RGGI program caps emissions by determining a regional budget of CO_2 allowances, and then distributes a majority of the CO_2 allowances through quarterly regional auctions so that the states may reinvest the value of the allowances into strategic programs. Collectively, the nine RGGI participating states represent 16 percent of the U.S. economy and generate a total gross domestic product of 2.4 trillion U.S. dollars.

Through our participation in RGGI and other climate change mitigation programs, Connecticut's experience has shown that significant reductions in carbon pollution—such as the CPP now requires—can be achieved affordably and reliably. Collectively, the RGGI states have already reduced power sector carbon pollution by over 40 percent since 2005. During this time the RGGI states' use of non-hydro renewables has increased by 63 percent. In 2013, the RGGI states produced about half of their power from clean or renewable sources.[1] The RGGI states' CPP targets are among the most stringent in the country, but we are well-positioned for compliance. As a group, the RGGI states are on track to reduce our power sector carbon pollution to 50 percent below 2005 levels by 2020, well beyond the national CPP projection of 32 percent by 2030.

Our experience has shown that RGGI and complementary programs in Connecticut have been accompanied by consumer savings, economic growth, and reliable power. In Connecticut, as of 2012 we have achieved a ten percent reduction in emissions from 1990 levels economy-

wide, while our population has grown nine percent, and our GDP increased by 41 percent. We see similar progress in all RGGI states. Since 2005, the region's GDP has grown by 8 percent as our carbon pollution declined 40 percent [see Appendix, Graph 1]. Independent reports by the Analysis Group have found that the RGGI program produced net economic benefits in each and every RGGI state. A recent Analysis Group report concluded that RGGI's second three years (2012-2014) are adding $1.3 billion in net economic benefit to the region, creating 14,200 job-years, and generating $460 million in consumer energy bill savings.[2] These benefits come in addition to findings from the program's first three years (2009-2011), which are adding $1.6 billion net economic benefit, 16,000 job-years, and $1.3 billion in consumer energy bill savings.[3] Our experience demonstrates that climate action and economic progress are compatible.

These findings focus on economic factors, and do not include the benefits of avoided climate change or improvements to public health. Real benefits including these factors would be far higher. Cleaner air is critical to safeguard the health of our families. One study found that our transition to a clean energy economy is saving hundreds of lives, preventing thousands of asthma attacks, and reducing medical impacts and expenses by billions of dollars.[4]

A 2015 peer-reviewed study concluded that RGGI is playing a significant role in the region's reduction in carbon pollution.[5] Complementary state policies and programs are also helping to drive these cost-effective achievements. These policies include utility-administered energy efficiency programs and renewable portfolio standards, which are common across the country. Market forces are driving further reductions, by encouraging fuel-switching to less carbon-intensive fuels. The RGGI program works in tandem with these policies and market trends to reduce pollution and establish long-term solutions for a reliable energy system.

Across the region, RGGI's 29 auctions have generated over $2 billion in proceeds. The reinvestment of RGGI auction proceeds in clean energy and consumer benefit programs is driving a virtuous cycle, further reducing carbon emissions and reinforcing these benefits. Through 2013, the RGGI states reinvested over $1 billion in auction proceeds in energy efficiency, clean and renewable energy, and other strategic energy programs. More than 3.7 million households and 17,800 businesses participated in programs funded through these investments. Connecticut accounted for more than $84 million of this regional investment, with more than 90 percent of the State's auction proceeds directed toward energy efficiency projects and clean and renewable energy.

In Connecticut, the reinvestment of auction proceeds has helped fund innovative programs that are harnessing market forces and competition to scale clean energy deployment at the lowest cost. Under the leadership of Governor Malloy, our State established the nation's first Green Bank, a quasi-public organization that leverages limited public dollars to attract private investment in clean energy in the State. The Connecticut Green Bank has used RGGI proceeds to help fund projects such as the development of solar photovoltaic (PV) and fuel cell installations in commercial, municipal, non-profit, and educational settings, and the installation of residential solar PV systems. The Green Bank has also partnered with the Connecticut Energy Efficiency Fund and incorporated RGGI proceeds in the Clean Energy Communities Program, encouraging Connecticut cities and towns to reduce their municipal building energy consumption. Funded through RGGI proceeds and ratepayer contributions, the Connecticut Energy Efficiency Fund's investments in energy efficiency and peak demand reduction in 2014 resulted in annual energy savings of 387.8 million kilowatt hours, and will avoid 3.2 million tons of carbon pollution over

the lifetime of the efficiency improvements.[6] Connecticut's energy efficiency investments planned for the next three years will reduce carbon emissions by 459,174 tons per year, and save enough energy to power a 262 megawatt power plant.[7] These investments are lowering customers' bills, and securing our state's long-term energy future.

Climate change and aging infrastructure pose threats to our economy and to the electric grid. The 2014 National Climate Assessment projected global sea levels to rise between one and four feet by 2100. It found that even without any increase in storm strength, two feet of sea level rise would more than triple the frequency of dangerous coastal flooding throughout most of the Northeast.[8] Extreme precipitation is also on the rise in the Northeast: we've seen an increase of over 70 percent in the amount of precipitation falling in very heavy events, a trend which is projected to continue. My State's Climate Preparedness Plan has warned of negative climate change impacts to Connecticut's agriculture, infrastructure (especially coastal infrastructure), natural resources, and public health.[9] This is why our State has set a long-term target to reduce greenhouse gases across all sectors to 80 percent below 2001 levels by 2050. Earlier this year, Governor Malloy convened a Governor's Council on Climate Change to develop a climate strategy that puts the state on a path to achieve near and long-term emission reductions across all sectors.

The recent Quadrennial Energy Review found that severe weather is the leading cause of power disruptions, costing the U.S. economy from $18 billion to $33 billion a year.[10] We have experienced these adverse climate impacts directly in Connecticut, resulting in direct costs to its citizens and businesses. According to our Department of Insurance, properties along the Connecticut coastline are collectively valued at over $570 billion; insurance companies paid nearly $1 billion for 200,000 covered claims as a result of five major storms in 2011 and 2012, including an unusual Halloween nor'easter, Tropical Storm Irene, and Superstorm Sandy. The cost of restoring power and rebuilding electric distribution lines damaged in those storms has reached to the hundreds of millions of dollars.

As Deputy Commissioner for Energy, I believe that reliability and affordability of energy are of utmost importance in implementing any program. RGGI helps manage these threats by reducing harmful emissions, and supporting reliability through energy efficiency, peak demand reduction, and other strategic investments. Investments funded through RGGI have advanced reliability goals in the region, even as our generation mix has changed and become cleaner.

Industry voices have also affirmed that continued reductions in power sector carbon pollution are achievable and affordable. Power generators Calpine, PG&E, and National Grid were joined by Austin Energy and Seattle City Light in filing a motion to intervene in support of the CPP. Their filing states, "The Power Companies support the Clean Power Plan because it will harness market forces to hasten trends that are already occurring in the electricity sector... the Power Companies have reduced CO_2 emissions within their respective generation fleets and portfolios. Their collective experience achieving those reductions demonstrates the achievability and reasonableness of the CPP."[11] Other power producers have made similar public statements that they do not anticipate continued pollution reductions to affect affordability or reliability.

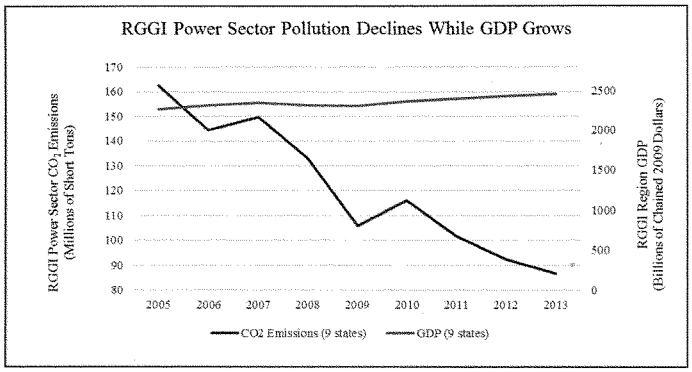
Connecticut has set a positive example through our individual accomplishments, and by working cooperatively with other states as a region. Multi-state programs have been repeatedly recognized by experts as the most cost-effective and reliable way to reduce carbon pollution.

Multi-state, mass-based programs like RGGI are especially advantageous because they reflect the regional nature of the electricity grid, and allow for a simple, transparent, and verifiable tracking and compliance system. The nine RGGI states are quite diverse, spanning three separate regional transmission organizations, different political landscapes, and dissimilar generation profiles, but through seven years of implementation—including changes in political leadership and generation mix—this diversity has proven to be a great strength. The RGGI program provides flexibility for each participating state to determine, for example, the amount of allowances to offer at auction, and how to reinvest the auction proceeds. The RGGI states have a strong commitment to reinvesting in strategic energy initiatives, as well as other consumer benefit programs. Regional programs like RGGI also introduce administrative efficiencies and foster regional cooperation.

The Clean Power Plan supports multi-state cooperation to reduce power sector carbon pollution, offering many pathways by which groups of states can work together. Connecticut has found that regional cooperation through RGGI, combined with complementary state programs, have allowed us to cut pollution while maintaining reliability, creating jobs, and boosting local economies. With this approach, we believe we are well-prepared to comply with the CPP requirements within the timeline established by the EPA. We look forward to sharing our success story to assist any other stakeholders, states, or regions who are interested in learning more. I again thank the Committee for the opportunity to testify.

Appendix

Graph 1:



[1] EIA Detailed State Electricity Data

[2] "The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI's Second Three-Year Compliance Period." The Analysis Group, 2015.

[3] "The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States: Review of the Use of RGGI Auction Proceeds from the First Three-Year Compliance Period." The Analysis Group, 2011.

[4] "How science, advocacy and good regulations combined to reduce power plant pollution and public health impacts; with a focus on states in the Regional Greenhouse Gas Initiative." Clean Air Task Force, 2015.

[5] "Why have greenhouse emissions in RGGI states declined? An econometric attribution to economic, energy market, and policy factors." Brian Murray and Peter T. Maniloff, 2015.

[6] Connecticut Energy Efficiency Board 2014 Programs and Operations Report. Connecticut Energy Efficiency Fund, 2015.

[7] 2016-2018 Electric and Natural Gas Conservation and Load Management Plan.(submitted to CT DEEP for review). Eversource Energy, The United Illuminating Company, Connecticut Natural Gas Corporation and The Southern Connecticut Gas Company, October 1, 2015.

[8] National Climate Assessment: Northeast. 2014.

[9] Connecticut Climate Change Preparedness Plan. 2011.

[10] Quadrennial Energy Review. US Department of Energy, 2015.

[11] "Unopposed Motion of Calpine Corporation, the City of Austin D/B/A Austin Energy, the City of Seattle, by and Through Its City Light Department, National Grid Generation, LLC, and Pacific Gas and Electric Company for Leave to Intervene in Support of Respondents." 2015.

Biographical Information

Katie Dykes
Deputy Commissioner for Energy,
Connecticut Department for Energy and Environmental Protection
Chair, Regional Greenhouse Gas Initiative, Inc. Board of Directors

Katie Dykes is the Deputy Commissioner for Energy at the Connecticut Department of Energy and Environmental Protection (CT DEEP).

As Deputy Commissioner, Katie works with both halves of the agency's Energy branch: the Public Utilities Regulatory Authority (PURA) on the regulatory side, and the Bureau of Energy and Technology Policy on the energy strategy side. Katie provides leadership at a defining moment in the agency's history as DEEP moves forward to achieve the goals of Connecticut's energy agenda by bringing cheaper, cleaner, and more reliable energy to the state.

Katie currently serves as the Chair of the Board of Directors of the Regional Greenhouse Gas Initiative, Inc. She also represents Connecticut on the New England States Committee on Electricity.

Katie joined CT DEEP in March 2012, after serving as Deputy General Counsel for the White House Council on Environmental Quality. In that role she provided legal counsel on a variety of energy and environmental issues including climate change and sustainability. Prior to that, she served as Legal Advisor to the General Counsel for the U.S. Department of Energy. At the Department of Energy, she worked on issues related to regulatory reform, electric power transmission, energy efficiency, and renewable energy.

Katie holds a bachelor's degree in history and environmental studies from Yale, a master's degree in history, also from Yale, and she is a graduate of Yale Law School.

Chairman SMITH. Thank you, Ms. Dykes.
And, Mr. Knappenberger.

**TESTIMONY OF MR. CHIP KNAPPENBERGER,
ASSISTANT DIRECTOR,
CENTER FOR THE STUDY OF SCIENCE,
CATO INSTITUTE**

Mr. KNAPPENBERGER. Well, good morning, Chairman Smith and Ranking Member Esty and the other distinguished Members of the Committee. I thank you for the opportunity to testify this morning.

I'm Paul Knappenberger, Assistant Director of the Center for the Study of Science at the Cato Institute, a nonprofit, nonpartisan public policy research institute located here in Washington, and Cato is my sole source of employment income.

Before I begin my testimony, I'd like to make clear that my comments are solely my own and do not represent any official position of the Cato Institute.

For the past 25 years or so, I've conducted research on climate and climate change, including working to quantify potential human influences upon it. So let me begin by saying that climate change is real and that results from both human and natural factors. Human contributions include large-scale changes to the natural landscape, as well as emissions of greenhouse gases and aerosols. Natural influences include internal oscillations such as El Nino that's going to make this year especially warm, and external influences such as the variations in solar activity. Together, such factors act to steer the Earth's weather and climate both in time and place.

These facts are undisputed. What is disputed is the degree to which we can separate and identify the influence of those factors on global—and even more importantly—on the local scales where human-climate interaction takes place. While there's a broad agreement the Earth's temperature has risen nearly a degree Celsius over the past 150 years, the level of uncertainty in our understanding of the individual factors behind this observed rise is quite substantial. Consequently, bankable and actionable projections of the evolution of the Earth's future climate are largely lacking.

But even with those caveats in mind, it is possible to glimpse the sort of climate impacts that U.S. actions aimed at mitigating climate change by reducing carbon dioxide emissions will have. To do so, I employ a widely used—in both national and international climate assessments—tool called the Model for the Assessment of Greenhouse Gas-Induced Climate Change, which is appropriately or not the acronym MAGICC.

And MAGICC was in part funded by the EPA and is freely available online. It's a climate model emulator that takes as input emissions scenarios and outputs projected temperature change, which are an actual metric of climate.

So first, I'll look at the EPA's climate—Clean Power Plan and its goal to reduce carbon dioxide emissions from power plants by 32 percent by the year 2030. MAGICC shows those reductions would result in a global warming—a global temperature savings by the end of this century of about 2/100 of a degree. This is neither meaningful, nor scientifically detectable.

The Clean Power Plan plays a major role in the Climate Action Plan that the United States is going to offer up at the United Nations upcoming climate conference in Paris beginning later this month. There, the United States will pledge to reduce greenhouse gas emissions by 26 to 28 percent below the 2005 level in 2025, and this is just a step along the way to an 80 percent reduction by the year 2050.

Now, even if the United States were to achieve its 2025 pledge, which requires actions that go beyond the Clean Power Plan, the projected temperature rise averted by the year 2100 would be about 4/100 of a degree. And even if we were to reach an 80 percent reduction, the temperature savings only totals about 1/10 of a degree. That's a very small part for the societal transformation that's going to have to happen to make that 80 percent reduction come to pass.

Now, the other nations of the world have offered up their own Climate Action Plans, and a critical analysis of those collective scenarios is that they depart very little from what seems like business-as-usual plans. Basically, the individual countries are emphasizing economic development over climate change concerns.

The expected temperature rise from the current set of international offerings is about 3.5 degrees Celsius, which is far beneath the—which is far above the often talked about but rather arbitrary 2 degrees Celsius target.

Now, all of the temperature projections I've thus far described have assumed that the Earth's climate sensitivity—that's how much the temperature will rise for a doubling of the Earth's carbon dioxide concentration—is about 3 degrees Celsius when in fact there's a growing body of scientific literature and a growing consensus that the Earth's climate sensitivity is actually closer to 2 degrees Celsius. So if you rerun MAGICC with this lower value of the Earth's climate sensitivity, the projected temperature changes decrease by about 25 percent.

Now, this implication is twofold. First, the already minuscule impact U.S. actions will have on future climate change is further reduced; and second, the temperature rise associated with business as usual will result in a less-than-commonly-advertised warming not far from the U.N.'s 2 degree C target. These two considerations lower the urgency and bring into question the necessity of U.S. climate mitigation efforts like the EPA's Clean Power Plan, the President's Climate Action Plan, and pledges to the United Nations.

Thank you.

[The prepared statement of Mr. Knappenberger follows:]

WRITTEN TESTIMONY OF

PAUL C. KNAPPENBERGER

ASSISTANT DIRECTOR
CENTER FOR THE STUDY OF SCIENCE
CATO INSTITUTE
WASHINGTON, DC

HEARING ON

THE ADMINISTRATION'S EMPTY PROMISES FOR THE INTERNATIONAL CLIMATE TREATY

BEFORE THE
U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

NOVEMBER 18, 2015

I am Paul C. Knappenberger, Assistant Director of the Center for the Study of Science at the Cato Institute, a nonprofit, non-partisan public policy research institute located here in Washington DC, and Cato is my sole source of employment income. Before I begin my testimony, I would like to make clear that my comments are my own and do not represent any official position of the Cato Institute.

For the past 25 years, I've conducted research on climate and climate change including working to quantify potential human influences upon it.

Let me start off by saying that climate change results from a variety of factors, both human and natural, and takes places on times scales spanning decades to eons. Within the separation of causes, numerous influences are at play. Human contributions include large-scale changes to the natural landscape including the effects of urbanization, agriculture, and forestry, as well as atmospheric emissions of greenhouse gases such as carbon dioxide along with aerosol particulates and their precursors. Natural influences to the climate include internal oscillations (such as El Niño) as well as external influences such as variations in solar activity and volcanic eruptions. Together, all of these factors, and, in fact, many others, act to steer the earth's weather and climate, through both time and place.

These facts are undisputed. What *is* disputed is the degree to which we can separate and identify the influence of those individual factors, on global, and even more importantly, on local scales (the scale in which we as individuals interact with the climate). While there is broad agreement that the earth's average surface temperature has risen nearly a degree Celsius over the past 150 years or so, the level of uncertainty in our understanding of the individual factors behind this observed rise is substantial. For example, while it is well understood that an increase in the atmospheric concentration of carbon dioxide will exert a warming pressure on the earth's surface temperature, the magnitude and character of the climate change that may result is still a matter of considerable scientific research and discussion. As a consequence, bankable and actionable projections of the evolution of earth's future climate are, in many cases, not possible. Furthermore, the projections that are being produced, not only of climate change but also as to its impacts, are subject to so many competing assumptions that they can be readily manipulated to produce virtually any outcome—a non-robust situation in the light of the large diversity of current political opinions.

With those caveats in mind, I'll take a look at some of the projections of climate change as a direct result of atmospheric emissions from human activities—primarily the burning of fossil fuels such as coal, oil, and natural gas, to produce energy. As a metric of climate change, I'll use the change in the global average surface temperature. My focus will be on the impact of U.S. regulations and proposals aimed at mitigating future climate change by reducing the carbon dioxide emissions from the consumption of energy produced by greenhouse-gas emitting fossil fuel sources. I'll also place the U.S. impacts in a global reference frame.

Using a readily available tool that was in part developed through support of the U.S. Environmental Protection Agency—a climate model emulator acronymed MAGICC for the Model for the Assessment of Greenhouse-gas Induced Climate Change[1]—I (or anybody else for

[1] Model for the Assessment of Greenhouse-gas Induced Climate Change, MAGICC: http://live.magicc.org/

that matter) can input the greenhouse gas emission reductions that are anticipated to be accomplished by federal regulations or other actions, and have them turned into global temperature savings. MAGICC is a widely used tool both in U.S. federal climate assessments as well as those produced by the United Nation's Intergovernmental Panel on Climate Change (IPCC) to explore climate outcomes resulting from alterations to emissions scenarios or other climate parameters.

One would think that employing MAGICC to assess the *climate* impact of the myriad of federal regulations and other actions specifically targeted towards mitigating future *climate* change would be standard operating procedure, however, quizzically, it is not often done (or reported?). Instead, the impacts of the new or proposed regulations are usually touted in terms of emissions savings—which are not a metric of climate change. Here, I will fill this glaring omission by translating the reported emissions savings into an actual climate metric—the resulting change to the projected global average temperature.

First, I'll look at the EPA's Clean Power Plan. According the EPA, the goal of the Clean Power Plan is to reduce the level of carbon dioxide emissions produced by U.S. power plants in the year 2005 by 32% by the year 2030[2]. Through the powers of MAGICC, it is revealed that those emissions savings would result in a global temperature savings (that is, projected temperature rise averted) by the end of this century, of about 0.02°C (two one-hundredths of a degree Celsius) (assuming a middle of the road emission scenario (SRES A1B) and a climate sensitivity of 3°C (a value that is increasingly looking to be too high, more on this later)). As I discussed earlier, there is a considerable level of uncertainty about this estimate, but the uncertainty revolves generally around whether the Clean Power Plan will avert one one-hundredths of a degree or three one-hundredths of a degree of future temperature rise. In other words, it doesn't change the overall picture—that the Clean Power Plan, in and of itself, produces no meaningful or even scientifically detectable alteration to the future course of the earth's climate.

If this information is included in the actual Clean Power Plan or its supporting documents, I could not find it, nor has anyone pointed it out to me. However, the documentation of the Clean Power Plan prominently includes a lengthy discourse on the EPA's assessment of anthropogenic climate change and its perceived negative impacts. The lack of quantification of how the Clean Power Plan will serve to mitigate those changes or impacts represents an awkward omission.

Using the same methodology described above, one can run the numbers for the longer-term targets that President Obama has put forward—that is, an overall reduction of greenhouse gas emissions from the U.S. of 80% by the year 2050. Again, this scenario is readily input into EPA's MAGICC tool and the resulting temperature "savings" is about 0.11°C—in other words, about one-tenth of one degree.

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[2] EPA's Clean Power Plan as it is described in the Federal Register: http://www.gpo.gov/fdsys/pkg/FR-2015-10-23/pdf/2015-22842.pdf

It is this environmentally inconsequential number which must be at the forefront of any and all discussions as to whether to force the transformation of our energy system necessary to meet such a target.

And yet such discussions are taking place with scarce mention of this scientific reality.

At the end of this month, in Paris, France, the U.N. will hold its 21st meeting of the Conference of the Parties (COP21) to the 1992 United Nations Framework Convention on Climate Change (the Rio Treaty)—whereby nations of the world agreed to try to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

Last year, at COP20, in Lima, Peru, countries were assigned a homework project to be completed prior to this year's meeting—to come up with their own "Intended Nationally Determined Contributions" towards reducing greenhouse gas emissions with an eye towards achieving the objective of the Rio Treaty. In the INDCs, each country got to decide for itself (rather than from an international mandate) how it was going to handle the issue of climate change and what steps it was going to take to mitigate it. In its INDC, each country shared its specific intents with the rest of the world.

In the U.S. INDC it says "the United States intends to achieve an economy-wide target of reducing its greenhouse gas emissions by 26-28 per cent below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%" and added that "This target is consistent with a straight line emission reduction pathway from 2020 to deep, economy-wide emission reductions of 80% or more by 2050. The target is part of a longer range, collective effort to transition to a low-carbon global economy as rapidly as possible."[3]

Interesting, and perhaps reflecting current U.S. emissions trends, the U.S. INDC is a slight weakening of the pledges previously offered at the 2009 UN COP15 in Copenhagen, Denmark. At the COP15, the U.S. pledged to reduce its national greenhouse gas emissions by 17% below the 2005 levels and added in a footnote that "The pathway set forth in pending legislation would entail a 30% reduction in 2025 and a 42% reduction in 2030, in line with the goal to reduce emissions 83% by 2050." That "pending legislation" never came into law.

Figure 1 shows historical U.S. carbon dioxide emissions from 1990-2013 along with the pledges offered in COP15 and COP21. U.S. greenhouse gas emissions peaked in 2007 and have declined since, largely as a result of an economic downturn, natural gas replacing coal in the mix of fuels used to generate electricity, with a far smaller contribution from the increase in renewable energy sources and other federal actions aimed at reducing greenhouse gas emissions.[4] If the downward trend from 2005-2013 were to continue through 2020, the goal of reaching a level 17% below the 2005 level would be achieved. However, a continuation of that trend is uncertain given the

[3] United States Intended Nationally Determined Contribution: http://www4.unfccc.int/submissions/INDC/Published%20Documents/United%20States%20of%20America/1/U.S.%20Cover%20Note%20INDC%20and%20Accompanying%20Information.pdf

[4] U.S. Energy Information Administration, "U.S. Energy-related Carbon Dioxide Emissions, 2013": http://www.eia.gov/environment/emissions/carbon/

ongoing economic recovery and a lessening of the rate at which natural gas is replacing coal in the energy mix. The slackening of the downward trend in emissions in recent years is perhaps one of the reasons that the 2025 target in the US INDC is slightly lower than its COP15 (Copenhagen) pledge.

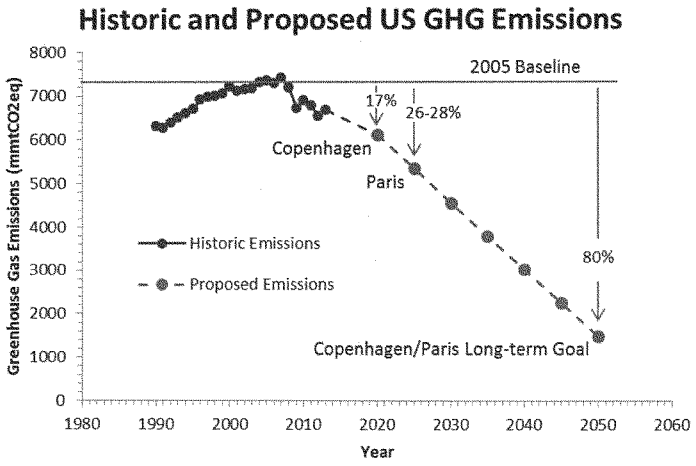

Figure 1. Historic and proposed greenhouse gas emissions from the United States.[5]

But even with the less aggressive INDC pledge, it is unlikely that the U.S. will be able to achieve its 2025 target with existing legislation. A recent analysis by Climate Action Tracker, a consortium of four research groups established to track the climate effectiveness of the country-by-country INDCs, reports that while the Clean Power Plan is a vital part of U.S. efforts to meet its pledged 26-28% reduction, it, along with all current regulations, is insufficient. They write:

> "According to our analysis, the finalised Clean Power Plan issued in August 2015 contributes to moving towards the emission levels indicated in the INDC. But the US will need to implement additional policies to reach its proposed targets. The planned policies (e.g. the additional actions mentioned in the Climate Action Plan), if fully implemented, are sufficient to meet the 2020 pledge. The US will have to implement additional policies on top of the currently planned policies to reach its 2025 pledge, which requires a faster reduction rate than the rate before 2020."

[5] Data on historic greenhouse gas emissions are from the EPA: http://www3.epa.gov/climatechange/ghgemissions/usinventoryreport.html

Figure 2 is a graphic developed by Climate Action Tracker that indicates the level of deficiency. Even considering everything on the books, being proposed, or still under development, the projected trajectory of future greenhouse gas emissions from the U.S. is not such that it will meet the 2020 goal (or a linear continuation of that target to 2050).

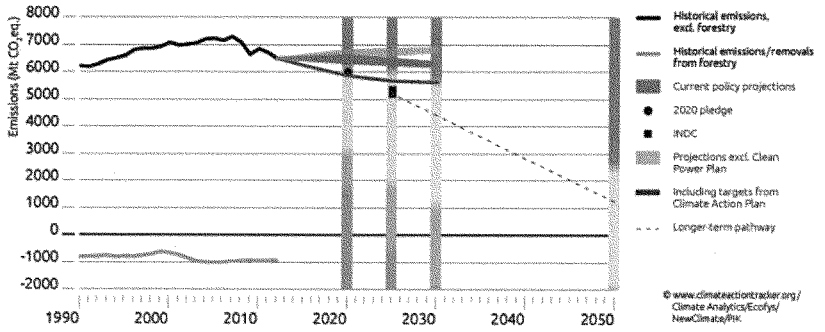

Figure 2. Historic (black line) and projected (colored lines) U.S. greenhouse gas emissions. The grey line indicated the projected emissions without including the anticipated impacts of the Clean Power Plan, the blue line are the projected emissions including the Clean Power Plan, and the purple line includes additional emission reductions from efforts described in the President's Climate Action Plan. The black circle is the US 2020 pledge made in COP15 and the black square is the US pledge made in its INDC for COP21.[6]

But even if the US were to achieve its 2025 INDC pledge it will produce little in the way of mitigating climate change. Again, turning to MAGICC, if the U.S. successfully achieved its 2025 INDC target and maintained that emissions level throughout the rest of the 21st century, the projected temperature rise averted by the year 2100 would amount to about 0.04°C. As previously mentioned, the U.S.'s intended 80% decline by 2050 averts about 0.11°C of future warming.

But these values are, as usual, absent from the U.S. INDC itself.

One reason often given for why such numbers are not included in such analyses is that the U.S. actions should not be judged in isolation, but as part of a larger global effort to mitigate climate change.

So I'll answer the question "If everyone else in the world played along, how much global warming would that avert?"

With the build-up to the Paris U.N. climate conference, several analyses have been undertaken by independent organizations to assess the global temperature implications from the complete

[6] Climate Action Tracker, "USA": http://climateactiontracker.org/countries/usa.html

collection of the 130+ INDCs (currently covering over 90% of global carbon dioxide emissions) which have been submitted by the parties to the Rio Treaty. In a recent report[7], the World Resources Institute collected together these various temperature change projections and reported that they range from an end of the century temperature rise of 2.7°C up to 3.7°C. The WRI noted that "[s]cenarios showing higher temperature increases by 2100…assume no continued progress after the INDCs are achieved…[while] [t]he scenarios showing lower temperature increases…assume that mitigation effort of 2020-2030 continues throughout the century."

A critical look at the "baseline" scenarios—that is, those that do not include explicit actions addressed at mitigating climate change—indicates that the projected temperature rise by the year 2100—is in the 3.0°C to 4.0°C range[8]. Which means that the current set of global INDCs barely departs from the baseline (i.e., business-as-usual) expectations for the global economy going forward.

This outcome is indicated by the U.N.'s own assessment of the INDCs as shown in Figure 3[9]. The orange range indicates the pre-INDC case of global greenhouse gas emissions and the yellow bars (at 2025 and 2030) indicate the range of emissions expected to result if the pledges made within the INDCs are actually met. As a comparison, the blue ranges indicate the global emissions pathways (beginning in either 2020, 2025, or 2030) required to limit the total global average temperature rise to 2.0°C—a number identified by the U.N. as necessary to avoid a dangerous human impact on the climate. Note that the pathway indicated by the INDCs bears little relation to the necessary steps to keep total warming beneath 2.0°C. Rather, the nations are signaling their intent to support efforts to grow their local economies rather than limit global temperature change. [10]

[7] World Resources Institute "INSIDER: Why Are INDC Studies Reaching Different Temperature Estimates?" http://www.wri.org/blog/2015/11/insider-why-are-indc-studies-reaching-different-temperature-estimates

[8] Paul C. Knappenberger presentation to the Cato Institute Conference "Preparing for Paris, What to Expect from the U.N.'s 2015 Climate Conference": http://www.cato.org/multimedia/events/preparing-paris-what-expect-uns-2015-climate-change-conference-panel-3-realistic

[9] United Nations "Synthesis Report on the Aggregate Effect of INDCs": http://unfccc.int/focus/indc_portal/items/9240.php

[10] Cass, O., 2015. *Leading Nowhere: The Futility and Farce of Global Climate Negotiation*. Manhattan Institute: https://www.manhattan-institute.org/html/leading-nowhere-futility-and-farce-global-climate-negotiations-7816.html

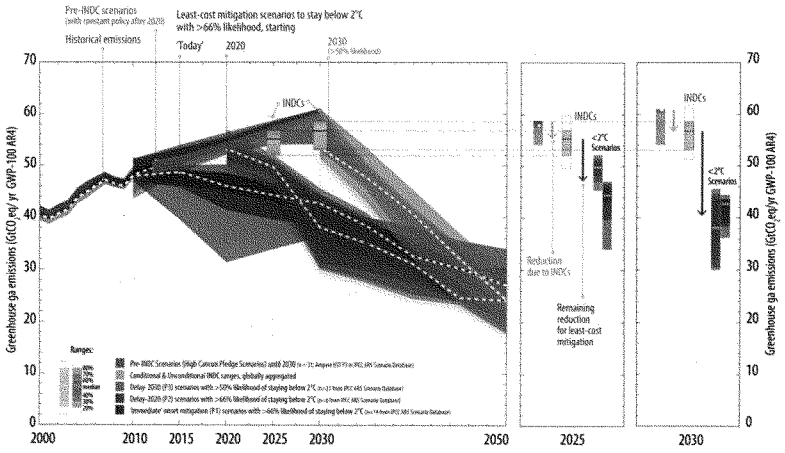

Figure 3. Comparison of global emission levels resulting from the intended nationally determined contributions in 2025 and 2030 with other trajectories (source: United Nations).

Despite this reality, the possibility of limiting the temperature rise from human greenhouse gases to 2.0°C above the pre-industrial level is still not out of the question (if you are so inclined as to place significance on the 2.0°C number).

All of the temperature projections that I have described thus far in my testimony have been determined based on the assumption that the earth's climate sensitivity—that is, how much the average surface temperature of the earth will increase under a doubling of the atmospheric concentration of carbon dioxide—is about 3.0°C. In fact, there is a growing body of scientific literature, and a growing consensus, that the earth's climate sensitivity is actually close to 2.0°C (Figure 4).[11]

[11] Michaels, P.J., and P.C. Knappenberger, 2014. Quantifying the Lack of Consistency between Climate Model Projections and Observations of the Evolution of the Earth's Average Surface Temperature since the Mid-20th Century. *American Geophysical Union Fall Meeting*, San Francisco, CA, Dec. 15-19, Paper A41A-3008.

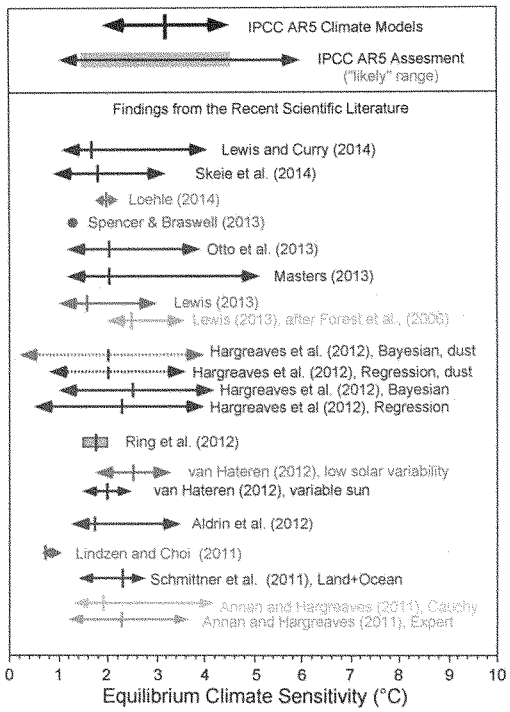

Figure 4. Climate sensitivity estimates from new research beginning in 2011 (colored), compared with the assessed range given in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) and the collection of climate models used in the IPCC AR5. The "likely" (greater than a 66% likelihood of occurrence) range in the IPCC Assessment is indicated by the gray bar. The arrows indicate the 5 to 95 percent confidence bounds for each estimate along with the best estimate (median of each probability density function; or the mean of multiple estimates; colored vertical line). Ring et al. (2012) present four estimates of the climate sensitivity and the red box encompasses those estimates. The right-hand side of the IPCC AR5 range is actually the 90% upper bound (the IPCC does not actually state the value for the upper 95 percent confidence bound of their estimate). Spencer and Braswell (2013) produce a single ECS value best-matched to ocean heat content observations and internal radiative forcing. The mean climate sensitivity (3.2°C) of the climate models used in the IPCC AR5 60% greater than the mean of recent estimates (2.0°C).

When the MAGICC model is rerun with this lower value of the climate sensitivity, the projected temperature changes (both temperature rise and temperature rise averted) decrease by about 25 percent.

The implication is two-fold. First, the already minuscule impact that U.S. actions will have on future climate change is reduced still further, and second, the overall temperature rise associated with business-as-usual global greenhouse gas emissions will result in a less than commonly forecast global warming (and concomitant impacts—both on the natural environment and on human society) that is very close to the U.N.'s 2.0°C temperature target. These two considerations lower the urgency, and bring into question the necessity, of climate mitigation efforts like the EPA's Clean Power Plan, the President's Climate Action Plan or pledges to the United Nations.

When making decisions on matters regarding climate change, I urge you all to examine the projected quantitative impacts that the actions under discussion are expected to have on the climate and its future evolution. This type of information is vital in order to weigh the reasonably expected benefits against the reasonably expected costs. In most cases, I believe that you will be surprised at how small and uncertain the former actually are.

Short Narrative Biography

Paul C. "Chip" Knappenberger is the assistant director of the Center for the Study of Science at the Cato Institute, and coordinates the scientific and outreach activities for the Center. He has over 25 years of experience in climate research and public outreach, including 13 years with the Virginia State Climatology Office and 17 years as the Research Coordinator for New Hope Environmental Services, Inc. Chip has published numerous papers in the major atmospheric science journals on climate change, climate model testing, hurricanes, precipitation changes, weather and mortality, and Greenland ice melt, among many other areas.

He holds an M.S. and B.A. degrees in Environmental Sciences from the University of Virginia.

Chairman SMITH. Thank you, Mr. Knappenberger.

And, Dr. Smith, let me address my first question to you, and that is in what way is the EPA's modeling system flawed or biased?

Dr. SMITH. The issue is not——

Chairman SMITH. Turn on your mike there.

Dr. SMITH. Sorry. The issue is not so much in the system itself as in the assumptions that go into the analysis, but more importantly, the reporting of the results that come out of it.

Chairman SMITH. Right.

Dr. SMITH. As I indicated in my testimony just now, there are estimates that are coming out of EPA's modeling system that are not being reported to the public in the way that they come out of the analysis properly.

Chairman SMITH. And what would be the impact if it was reported correctly?

Dr. SMITH. Well, as I said, the—instead of reporting, for instance, $1 billion of costs in 2020, they would report $17 billion of costs in that year, and there's an overall bias generally. A present value of $76 billion for the net cost across the whole time period also would be valuable to report.

Chairman SMITH. So, in other words, if you skew the data, you can skew the results considerably?

Dr. SMITH. That's certainly true.

Chairman SMITH. Okay. Thank you, Dr. Smith.

And, Mr. Magness, you addressed this in your testimony as well, but if you can maybe give us a specific summary-what will states save, if anything, as a result of the Clean Power Plan? And more—I guess I'd say the reverse. What is the cost to the states and also what is the cost to consumers if you can be specific?

Mr. MAGNESS. Sure. In the ERCOT region what we found as far as specific cost to consumers was our model indicated that we would see a 16 percent increase in retail electric rates, and that's based on the amount that wholesale electric rates feed into the retail. So that was the basis of that in our modeling.

In addition, the costs of things like transmission infrastructure are rather difficult to estimate with specificity because it depends on which projects we need to build. But if—with the rubric that between $1 and $3 million per mile for transmission projects, and if you have to build long lines to take the place of units that have been retired, you're looking at multimillions of dollars pretty quickly.

Chairman SMITH. Right. I have seen, and maybe you're familiar with the analysis they came up with most States in the country would see double-digit increase in electric costs. Is that accurate?

Mr. MAGNESS. We've seen data that suggests that, and it's consistent with what we found in the ERCOT region.

Chairman SMITH. Was it 40 states? I can't recall how many, but it was over a majority.

Mr. MAGNESS. I've seen reports indicating that's——

Chairman SMITH. Roughly 40 States have ten percent or more increase in electricity costs as a result of this plan, which arguably has no significant impact on climate change. Is that right?

Mr. MAGNESS. We've seen that data——

Chairman SMITH. Okay.

Mr. MAGNESS. —yes, sir.

Chairman SMITH. Thank you, Mr. Magness.

And then, Mr. Knappenberger, what impact will EPA's Clean Power Plan have on Earth's climate, if any?

Mr. KNAPPENBERGER. Well, it's very small. I testified it was about 2/100 of a degree. That is 0.02. So you can't even detect such a change, and so——

Chairman SMITH. Right.

Mr. KNAPPENBERGER. —you would—you could put that in, and even if you met it, you—there's no quantifiable results that come out of it in terms of climate.

Chairman SMITH. Now, I used three one-hundreths of a degree Celsius. You used two one-hundreths. No matter whether either of us is right, it's insignificant one way or the other?

Mr. KNAPPENBERGER. Right.

Chairman SMITH. The other is how accurate is the science behind the claims connecting extreme weather with a change in climate?

Mr. KNAPPENBERGER. Well, unfortunately, there's an off——

Chairman SMITH. Or maybe I should make that specific. Increase in global warming, is there any connection between that and extreme weather?

Mr. KNAPPENBERGER. Yes, sure. There's a conflation—unfortunately, a conflation between climate and climate change. And so the Earth's climate, the Nation's climate, and Washington D.C.'s climate is characterized by extreme weather events. They happen all the time. And whether or not we put in—or we achieve any of these emissions reductions that we talked about, we're still going to have extreme weather events in the future. And they're weather events, and weather events are themselves influenced by tens or hundreds of individual factors. And so the science points to a climate change influence on some of those factors, but it's hard to know which ones are controlling the character of those events.

Chairman SMITH. So often individuals point to one extreme weather event and use that to deduce that there's some kind of a connection. They know and we all know you can't use one incident as an example of a larger trend, and in fact, hasn't the trend been down as far as extreme weather goes over the last several decades?

Mr. KNAPPENBERGER. That is true for many types of extreme weather across the United States.

Chairman SMITH. Okay. Thank you, Mr. Knappenberger.

The gentlewoman from Oregon, Ms. Bonamici, is recognized for her questions.

Ms. BONAMICI. Thank you very much, Mr. Chairman. And thank you again to all the witnesses.

Deputy Commissioner Dykes, the International Energy Agency recently released its World Energy Outlook Report for 2015. This report presents the Agency's projections for the evolution of the global energy system out to the year 2040 based on the latest data and market developments. And in the current report, the Agency states that the balance is shifting towards low carbon technologies, policy preferences for lower carbon energy options are reinforced by trends and costs as oil and gas gradually become more expensive to extract while the costs of renewables and of more efficient end-use technologies continue to fall."

So can you discuss how market dynamics have influenced the shift away from coal? And also, can you please discuss how the Clean Power Plan could influence current market trends toward a lower carbon—lower carbon technologies?

Ms. DYKES. Of course. So as I mentioned in the RGGI States through the implementation of our program, a mass-based multistate trading program such as the kind that the Clean Power Plan embraces, we've seen a reduction of 40 percent in carbon over the last ten years while growing our GDP by eight percent. And we've achieved that through a whole complement of different drivers. Some of them include market-based mechanisms because our program is sending a price signal to compliance entities to power plants and to renewable developers and so on. They're investing in, you know, building out new gas generation. We've seen a 36 percent increase in generation from gas in our region over that time period.

We've also seen falling costs of renewables over that time period, which also has helped to spur this transition, and then a range of, complementary programs, many of which are common across the country, including utility-administered energy efficiency programs, renewable energy programs such as renewable portfolio standards have contributed to this shift over to cleaner generation, as well as infrastructure and transmission investments.

And the RGGI program has created a virtuous cycle of reinvestment in catalyzing that transition. We auction the allowances to pollute—to emit carbon, and we reinvest those proceeds into renewable energy and energy efficiency programs. In my State in Connecticut 92.5 percent of those proceeds, $84 million during the time that we've participated in the program, we've been able to put back to work to help customers lower their bills through energy efficiency. That's helped to bring down wholesale electric costs.

At the same time, we've put those to work through innovative programs like the Connecticut Green Bank that are helping to deploy more renewable energy, which is making our grid more reliable, our fuel mix more diverse, and helping to again spur that transition that we've seen happen in our region in a very reliable and affordable way.

Ms. BONAMICI. Terrific. And I have another question. Opponents of the Administration's efforts to address climate change often say that even if the United States meets the goals of the Clean Power Plan, it would have a minimal effect on climate change in part because emissions from other countries like China and India might overtake any cuts we're able to make, and regardless, any cuts by the United States would be a proverbial drop in the global carbon bucket anyway. But they're missing some important pieces of the strategy of the United States and its partners.

How do you perceive the Clean Power Plan improving the United States—the credibility, leverage, and influence of our country in negotiations to achieve an international agreement to reduce global greenhouse emissions at the climate change conference in Paris? And why is it important for the United States to take on a leadership role in these negotiations?

And I want to add that, like your State of Connecticut, Oregon has been a leader in the renewable energy economy. I was proud

to be part of the State Legislature in 2007 when we passed our renewable fuel standards. What economic benefits will the United States have in leading the way in the development and administration of the next generation of energy technologies?

Ms. DYKES. Well, I can tell you it's so critical that the Obama Administration is putting our nation on track to reduce carbon pollution from its largest source sector in advance of the Paris negotiations, utilizing best practices that have been proven to be feasible across the various States.

You know, when I hear your question, I'm reminded of when Connecticut first began discussions with other States about starting RGGI. We got a lot of questions because we are not the biggest State in the country, and, you know, some would question why should our State lead? Why should the RGGI States lead? But now we are seeing the benefits of that leadership. We are seeing those benefits in terms of the jobs we've created in our State through the development of our clean energy programs, and we are well placed to comply with the Clean Power Plan.

But these benefits of leadership we are pleased to share with other States across the country who are looking to our model as a way to comply with the Clean Power Plan, and so those dividends of leadership I think will bring along other jurisdictions as well so we can address this global problem.

Ms. BONAMICI. Thank you. I see my time is expired. I yield back. Thank you, Mr. Chairman.

Chairman SMITH. Thank you, Ms. Bonamici.

The gentleman from Oklahoma, Mr. Lucas, is recognized for his questions.

Mr. LUCAS. Thank you, Mr. Chairman.

Dr. Smith, the EPA says that the Clean Power Plan results in $20 billion in climate savings. Those of us who've worked with any of these kind of matters knows that a lot of this comes down to what kind of discount rate is calculated in your projections. Could you explain to us what happens if that discount rate is adjusted?

Dr. SMITH. Yes. The climate benefits are based on a long future forecast of benefits that don't start immediately. They start to accumulate later in time, several decades to 100 years or more out into the future. So the $20 billion, which I believe is a three percent benefit in 2030 in the Regulatory Impact Analysis is based on a three percent discount rate of those long-term future benefits that are occurring in the next century. If a discount rate of five percent is used, that cost comes down to about $6 billion, and that's also observable in the Regulatory Impact Analysis.

But the important thing, even more important than the discount rate, is the fact that those are benefits that are calculated not for the United States but benefits—90 percent of them or so are in other countries. So even out of the 20 billion, if you accept the three percent discount rate, perhaps only about 2 billion of that is United States.

Mr. LUCAS. So then it's fair to say a lot of this comes down to what kind of accounting you use and how big a picture you draw to achieve these savings. And you're saying that it's—the accounting number used obviously generates that $20 billion number, but even at that, we have to count the whole planet?

Dr. SMITH. It's a choice but it's not the typical choice in doing benefit-cost analysis to include benefits outside of the jurisdiction of the group that's undertaking a cost.

Mr. LUCAS. Do we know from the way the numbers are put together how much of that $20 billion in savings actually is alleged to be derived here in the United States?

Dr. SMITH. Yes, as I said, it's about ten percent of the 20 billion.

Mr. LUCAS. So amazing. Doctor, also in the EPA's Clean Power Plan, would it be described fairly as an unauthorized regulatory cap-and-trade plan?

Dr. SMITH. I'm sorry. Could you——

Mr. LUCAS. The Clean Power Plan put forth by the EPA, is it fair to describe it as an unauthorized regulatory cap-and-trade plan? Some of us went through the cap-and-trade wars not many years ago when Congress as a whole chose not to do that.

Dr. SMITH. The way the rule is structured it allows states to put together cap-and-trade programs sort of voluntarily, and so in that sense it becomes a cap-and-trade program by way of regulation.

Mr. LUCAS. So in effect, what Congress would not do by regulation, it would happen?

Dr. SMITH. That's correct.

Mr. LUCAS. Fascinating. Fascinating, Mr. Chairman. Fascinating. I yield back my time, sir.

Chairman SMITH. Thank you, Mr. Lucas. The gentlewoman from Connecticut, Ms. Esty, is recognized for her questions.

Ms. ESTY. Thank you, Mr. Chairman, for holding today's hearing on the Environmental Protection Agency's final Clean Power Plan rule.

Connecticut's success with greenhouse gas reductions has been vast and extraordinary. We've already surpassed our 2020 goal of reducing emissions below 1990 levels and currently remain on a trajectory that will yield an 80 percent reduction of emissions below 2001 levels by 2050.

Connecticut's path forward is a very promising one, but we also know that no single country or State can possibly address climate change alone. Part of Connecticut's success with carbon pollution reduction can be traced to its participation in the Regional Greenhouse Gas Initiative, a mass-based multistate approach to reducing carbon pollution in the electric sector.

Empowering, empowering residents and citizens and businesses to use energy more efficiently as one of the key element of Connecticut's approach in particular in RGGI. In fact, according to a report that tracks investments made by RGGI States from 2008 to 2013, investment of RGGI proceeds, the cumulative investments in energy efficiency programs are vastly greater than investments in any other programs, including clean and renewable energy, direct-bill assistance, and greenhouse gas abatement.

So, Deputy Commissioner Dykes, in your testimony you highlighted the success stemming from Connecticut's participation in RGGI, as well as the ancillary programs Connecticut has developed like the Clean Energy Efficiency Fund. Can you drill down a little bit—because I think oftentimes the objections to plans like this in Washington are assumptions that it's going to be a top-down mandate of how to achieve goals, but in fact, having been on the rel-

evant committees in the State Legislature, I know that in fact it spurred a great deal of innovation, different approaches for towns like my town of Cheshire, which has exceeded its goals already, Waterbury, the largest city in my district, which are participating in state programs at their own option, developing their own ways of moving forward.

Can you sort of explain to my colleagues a little bit more how Connecticut has achieved that innovation and that flexibility and that tailoring to meet those goals and in fact exceed them, save money, and improve the environment?

Ms. DYKES. Absolutely. The programs that we've put in place and frankly the political commitment that's been created in Connecticut through Governor Malloy's administration and leadership of our General Assembly in adopting a statutory requirement to reduce carbon pollution has created an environment where all of these players are coming forward with different ways to reduce carbon pollution and make the transition to a clean energy economy, whether they are municipalities that are participating in our various commercial piece, financing programs, whether they are renewable developers who are taking advantage of our long-term contracting programs that are achieving renewable deployments at unheard-of low costs for renewable deployment, and down to individual customers who are making the choice to participate in energy efficiency programs that are not only putting money back into their pockets, helping businesses lower their operating cost, but they're also creating benefits for all ratepayers to the extent that they're helping us to avoid the cost of new generation and more transmission, and at the same time contributing to the resiliency of our grid.

You know, I want to take a little—maybe clarify to the point that Dr. Smith was responding to is that we don't believe that the EPA has created a mandatory cap-and-trade program through the Clean Power Plan. In fact, one of the things that the RGGI States asked for was for the EPA to provide flexibility for States, which has been so successful for us in how they comply. And of course States could pursue a traditional regulatory approach into adopting the Clean Power Plan requirements in normal permitting—permits for compliance entities, but EPA has been so many tools forward to allow States to opt into multistate mass-based programs to make trading with other States and other jurisdictions very feasible and flexible for States. And I think that that's one of the key features of that program, that it does respect those needs of States and desires of States to comply in a way that matches their policy goals.

Ms. ESTY. And if you can briefly talk a little bit about, for example, the Home Energy Solutions program, how that works in Connecticut again to put the power in the hands of consumers and businesses to make those choices.

Ms. DYKES. Absolutely. I'm always pleased to pitch the program. By just making a simple call to their utilities, our residents in Connecticut can achieve—receive hundreds of dollars worth of energy-saving upgrades for their homes, which help them feel more comfortable, reduce drafts, change out their lighting, and the—you know, we see tens of thousands of Connecticut residents taking ad-

vantage of this, especially low-income families and businesses who spend a lot of their budgets on energy—or on electricity.

Ms. ESTY. Thank you very much.

Chairman SMITH. And thank you, Ms. Esty.

The gentleman from Alabama, Mr. Brooks, is recognized.

Mr. BROOKS. Thank you, Mr. Chairman.

Will the Clean Power Plan have any discernible, i.e., statistical measurable and attributable impact on global temperature as a result of its implementation? If so, what will that impact be and how was that impact determined? And that's for whomever would like to answer that question.

Mr. KNAPPENBERGER. Well, I've attempted to quantify the impact of that, and it's very small. The Clean Power Plan is—only goes after, you know, U.S. power plant emissions, which are only part of the U.S. economy, which are only part of the world emissions. So it is that drop in the bucket of global emissions, and as a result, the resulting climate impact of achieving the plan is extremely small.

Mr. BROOKS. Would extremely small be synonymous with negligible?

Mr. KNAPPENBERGER. Yes, I would say that's correct.

Mr. BROOKS. Ms. Dykes, do you have a similar or different opinion?

Ms. DYKES. Well, again, I would say from the Connecticut experience, you know, the programs that we've put in place, our participation in RGGI, is—you could say is, you know, well, we've achieved significant reductions, 40 percent over the last ten years, and that's only one step towards what the global need to do in order to have a meaningful impact on reducing carbon emissions, but it is so critical that everyone make these steps because it is a global pollutant.

And so, you know, the leadership that we show by putting—by compliance with the Clean Power Plan I think sets a model and paves the way for other States—other countries to take action as well.

Mr. BROOKS. Well, let's worry about the United States for a moment. What kind of impact does this plan, the Clean Power Plan, have on the world situation? Well, the United States is a major emitter of greenhouse gas—greenhouse gases. The Clean Power Plan will achieve up to 32 percent emissions reductions from the electric sector, which is our largest source sector. So I think it's going to have a very meaningful impact in U.S. leadership in carbon reductions.

Mr. BROOKS. Do you have any way of quantifying what the Clean Power Plan's impact would be on total global emissions, some kind of percentage?

Ms. DYKES. I don't. I know that that's available from the EPA, and we see that—you know, we think that this leadership is really necessary and overdue.

Mr. BROOKS. Mr. Magness, do you have an opinion?

Mr. MAGNESS. Sir, as the grid operator in Texas, we haven't examined or modeled the global impacts I think that you're referencing. So I think certainly some of the concerns Mr.

Knappenberger raised have been raised by our state leadership, but we haven't modeled those in our particular study.

Mr. BROOKS. Dr. Smith, are there public health impacts when people lose their jobs and have lower incomes? And did the EPA take those into consideration in its rulemaking for the Clean Power Plan in your judgment?

Dr. SMITH. There are impacts when people's spending power is reduced, and this regulation is projected to reduce spending power. When that happens, people have to make substitutes in their choices, and there is evidence in the literature that there are health effects, and in fact mortality and—you know, greater mortality rates when spending power is reduced. Now, EPA did not account for this in their particular analysis of costs or benefits.

Mr. BROOKS. Is there any way in your judgment, given the information that you have and your experience and intellect, that you can share with us what kind of increase in mortality that you anticipate from the Clean Power Plan on the economic side, as opposed to the alleged benefits on the pollution side?

Dr. SMITH. I think the best way to think about that is to just simply compare the costs and the benefits, and when the actual benefits, the climate benefits are properly assessed and taken in a U.S. context and compared to the U.S. costs of this plan, the—it's not a good purchase.

Mr. BROOKS. Another question, Dr. Smith. How can EPA claim economic benefits from a rule that will increase consumers' electricity prices, decrease electricity reliability, and shut down affordable energy sources like coal-fired power plants?

Dr. SMITH. Again, the issue is these actions have costs, and costs have consequences. And when the costs are taken into consideration, they're quite substantial and they could create harm that's imminent and current in return for potential estimated benefits that are far in the future and appear on a U.S. basis to be less.

Mr. BROOKS. Thank you, Dr. Smith. I see my time is about to expire.

Mr. Chairman, I yield back the remainder.

Chairman SMITH. Thank you, Mr. Brooks.

And the gentlewoman from Maryland, Ms. Edwards, is recognized.

Ms. EDWARDS. Thank you very much, Mr. Chairman, and thank you to the witnesses as well.

You know, I just want to point out a couple of things. One, we've had about 40 years, 4 decades of experience that shows that the Clean Power Plan in fact will not cost jobs and it won't take down the economy. Actually, to the contrary, on balance, the regulations have spurred innovation and created economic opportunity. I think we heard Ms. Dykes speak to that.

The costs of inaction, in fact, on climate change far outweigh the costs of action. And I think that we can see that when you look at this last October, which will put us—sets us on pace for this year being the warmest record temperatures that we have seen on record since 2014, but prior to that, actually back into the 19—into the 1880s, preindustrial times. And so there's great cost of us not doing anything.

EPA is also, as Ms. Dykes has pointed out, is in fact meeting its statutory obligation to protect our public health and our environment. And EPA is using the best available science and giving the States the flexibility that they need that uses peer-reviewed science to engage in constructive technologies and techniques to make sure that we can deal with this. Contrary to what the other side is saying, there is no secret science here in the work that the EPA is doing.

There seems to be—one of the arguments that—and we've heard it on this panel today, that somehow it's—the greenhouse gas emissions reductions are so minimal that we shouldn't do anything about that. But I would point out that if we were to just go to the 2025 levels with the reductions targets that have been set in place, that in fact we would reduce our carbon emissions by about 20 percent. If we were to go out to the 2050 time frame, we would reduce those emissions by about 60 percent. This would have a measurable impact on temperatures and on climate change and on the United States' responsibility with respect to doing something about this because we are a global leader, and we are a significant contributor to greenhouse gas emissions.

And so with my time remaining I want to leave to Deputy Commissioner Dykes to talk about the kind of innovation and economic growth that's been spurred in Connecticut—Maryland is also a participating RGGI State; we are very proud of that—and how you can spur innovation and create jobs. And then I want you to speak to the importance of the United States' leadership in the world going into Paris knowing the numbers that we have now and the warmth that we are experiencing today even compared to last year and compared to the 1880s because I think if we don't do something now, we are in big trouble, and this committee bears a responsibility to do that. And I'll leave you the balance of my time.

Ms. DYKES. I appreciate that, Representative Edwards.

You know, we are very pleased to co-implement the RGGI program, along with the State of Maryland. And the highlight of the RGGI program is that each State retains its own flexibility to make choices about how to invest the proceeds from the sale of carbon allowances into those programs that match that State's particular policy preferences. And that includes, as I mentioned, investing in energy efficiency and renewable energy.

In Connecticut, for example, we took some of our RGGI proceeds and used them to fund the country's first Green Bank, which is leveraging that small amount of funds, along with some ratepayer contribution, to attract private capital, private investment into energy efficiency and clean energy. And so we're vastly expanding the impact of those dollars, at the same time demonstrating to the private sector the real investment opportunity in these technologies. And it's really taking—bringing capital off the sidelines that we see who's ready and poised to invest when that market signal is there.

Other States—I know Maryland also invests its proceeds in bill assistance, which is so critical for families and businesses as well, and we are just seeing all—innovations in terms of technologies, bringing down the costs and things like solar on rooftops, grid-scale wind, you know, the efficiency of wind turbines is getting better

every day. This is again because of the market signal that we are sending.

You know, we have I think through the independent report that was done by the Analysis Group, they've reviewed our program twice now and confirmed that although there are very modest impacts to bills as a result of the cost of the generators purchasing allowances, those are more than overcome for by, you know, billions of dollars of net economic benefit that accrues because of these reinvestment and efficiency energy savings programs and renewable programs from RGGI.

Ms. EDWARDS. Thank you so much for your testimony. And with that, I yield.

Chairman SMITH. And thank you, Ms. Edwards.

And the gentleman from Florida, Mr. Posey, is recognized for his questions, but would he yield to me briefly?

Mr. POSEY. Yes, sir, I would.

Chairman SMITH. I just want to make sure that the record reflects a couple of facts about the alleged claim that 2014 was the hottest year on record. If you read the footnote to that temperature, you find out that the NASA scientists say they were only 38 percent sure that that was accurate, less than 50/50.

Furthermore, the alleged increase in temperature was so small that it was within the margin of error over previous years. So I just want to make sure that people understand and put that in perspective.

And thank the gentleman for yielding and he continues to be recognized.

Mr. POSEY. Thank you, Mr. Chairman.

As I've learned well from the other side, some people have a tremendously good grasp of the small picture here.

I'd like to submit a slide from the Institute for 21st-Century Energy for the record.

[Slide.]

[The information appears in Appendix II]

Mr. POSEY. This slide shows a number of coal-fired power plants planned and under construction and their total capacity in megawatts.

I think the conclusion is fairly simple. The world is hungry for energy, and whether you like it or not, coal is going to be the energy that will do what's necessary to fill that gap. And nothing that happens in Paris is going to change that.

It seems somebody in the administration or a group in the administration seem to be in la-la land. I mean it's just not reality. And it's hard to understand why they seem to have no problem making life more difficult not only for American families but especially harmful to those in America and around the world who can least afford it. I just don't know why the other side would want to harm them.

Mr. Knappenberger, the Paris conference appears to be more about climate financing, so not only is the United States supposed to hobble its own economy with the Clean Power Plan in the name of the President's climate change agenda, it seems now we're going to be asked to pay billions to developing countries. Am I reading this right?

Mr. KNAPPENBERGER. That's definitely one aspect that's going to be discussed in Paris. It'd be surprising if something binding comes out of that, but they are going to talk about that.

Mr. POSEY. Do commitments in an international agreement that is not reviewed by Congress have any binding effect on domestic law?

Mr. KNAPPENBERGER. That's not my area of expertise. I've seen people who have suggested that there's difficulties with that.

Mr. POSEY. Professor Laurence Tribe compared the EPA's power grab in the Clean Power Plan to "burning the Constitution." Could the same be said of the Administration's international agenda here, do you think?

Mr. KNAPPENBERGER. Well, the Administration's international agenda, you've got to be careful with it because going forward, the climate change that's projected to occur is going to be coming from—90 percent from emissions from these developing countries. And so to—if you do something that sort of limits their ability to develop, that's going to be potentially far worse than whatever climate change might bring to them.

Mr. POSEY. In your testimony, you question the necessity for the Clean Power Plan in the President's pledge to the United Nations. Are you inferring that the technological investments and trends will already reduce carbon emissions without regulation or further pledges?

Mr. KNAPPENBERGER. I think that—I mean, business as usual is a pretty strong plan—is a pretty strong way forward. Energy—economies become more energy efficient over time and, and especially developing economies do that more rapid than developed economies. And our—in our case with the input of natural gas into the energy production system, we've become more carbon efficient with our economy, too.

So business as usual is a strong plan, and you can lower your emissions through technological advancements that don't need to be, you know, dictated from——

Mr. POSEY. Shoved down everybody's throat.

Already, 27 states, more than half the country, have filed legal challenges against the existing power plan regulation, a number that could grow even higher. Where are the President's international climate commitments if the rules he's relying on our thrown out by the courts?

Mr. KNAPPENBERGER. Well, it's very unlikely they're going to be able to be met.

Mr. POSEY. Okay. That's the questions I have, Mr. Chairman. Thank you. I yield back.

Chairman SMITH. Okay. Thank you, Mr. Posey.

And the gentlewoman from Massachusetts, Ms. Clark, is recognized.

Ms. CLARK. Thank you, Mr. Chairman. And thanks for having this hearing, to all our panelists for being with us today.

I'm very proud to be from a State that is part of RGGI. And thank you, Deputy Commissioner Dykes, for joining us. I wondered if you could talk a little bit about when we set the market value for carbon, how has that affected job creation in Connecticut?

Ms. DYKES. Well, I can tell you throughout the RGGI region we've seen an increase in jobs related to the investments that the RGGI States are making fueled by the proceeds from the sale of carbon allowances. So the Analysis Group completed an independent review, as I had mentioned in my testimony, that just from the last three years of implementation of the RGGI program we have generated 14,000 new job-years. Those are jobs that are in our States, whether it's installing insulation, putting renewable facilities into place, we're keeping dollars in our States, growing our own economies instead of exporting those dollars out of our region to pay for fossil fuels.

Ms. CLARK. Could you also go into a little more detail about the role of energy efficiency and the success of RGGI?

Ms. DYKES. Yes, energy efficiency is one of the most cost-effective ways for us to reduce carbon pollution, and that's recognized by States across the country who have programs to invest in efficiency. It creates so many benefits, whether, you know, to the customer who takes advantage of the measures by lowering their bills, but also by reducing the amount of electricity we need to flow across the region so we're avoiding the need to develop more transmission and new power plants.

This is why we call it the first fuel, and I know I've been very jealous of Massachusetts, which ranks number one very frequently in—across the country in their efficiency commitments.

Ms. CLARK. And could you talk a little bit—you mentioned before about the grid and how this has helped, and this is a huge concern, sort of the infrastructure of our electric grid across the country. Could you talk a little bit more about the impact of RGGI on your grid stability?

Ms. DYKES. Of course. You know, States have a long—and regional transmission organizations have a long history of factoring environmental compliance into the reliable operation of the grid, including capacity planning. You know, we are—we see the investments that we're making in renewables and energy efficiency helping to improve the resiliency and the reliability of our grid.

Right in Connecticut we invest in distributed generation, including microgrids, which help to provide resiliency, especially with the increased severity in storms that we are experiencing. We see—we're especially—pleased to see some of the improvements that the EPA has made in the final Clean Power Plan in providing a reliability safety valve and other mechanisms for States to plan for revisions of their state implementation plans if necessary if there are unforeseen consequences or challenges that arise.

But I would just stress that, you know, multistate mass-based programs like RGGI, because we span, you know, a diverse set of States with a diverse fuel mix, we cross three different regional transmission organizations, and this provides a lot of flexibility to address retirements where they occur, and it gives the compliance entities some mitigation of their risk because there's so much diversity in the fleet.

So that's been one of the great benefits that we've proven through the RGGI program that I think provides a lot of assurance for other States as they look at their options for compliance.

Ms. CLARK. Thank you. I also had a question for Mr. Knappenberger. I don't want to mischaracterize your testimony, but I'm trying to understand your position. You started your testimony by saying you believe we are experiencing climate change. It has natural and manmade causes behind it. But then we're sort of talking about the Clean Power Plan, some of the environmental measures that we're taking. I think you said they are so small; they're a drop in the bucket. I think you agreed with the characterization that they would be negligible.

So is your bottom line, is it fair to say that at the end of the day you're saying stay the course where we are, that we don't need any changes, or are you an advocate for more than we are currently doing or proposing to do to address climate change?

Mr. KNAPPENBERGER. Thanks for the question.

I'm a climate scientist and I've been studying the issue for 25 years I think I said, and I'm—I think a lot of what you hear about is being overblown. I don't—I think we're influencing the climate. I just don't think at the end of the day our—the net of our influence is going to be all that detrimental that we need to try to actively combat that.

Ms. CLARK. So business as usual is good enough?

Mr. KNAPPENBERGER. Yes.

Ms. CLARK. Thank you.

Chairman SMITH. Thank you, Ms. Clark.

The gentleman from California, Mr. Knight, is recognized.

Mr. KNIGHT. Thank you, Mr. Chair. I have a couple questions.

Mr. Knappenberger, if you could give me an idea. You gave testimony and there was an awful lot of information in there, but, you know, as we go into Paris, and we're about ten or eleven days away from doing that, is there disagreement that's going to come out of there? Everything that I've read is not a binding agreement, there's not an authority to enforce out of this agreement. But can you give me an idea, because I've read this, of what the cost is going to be?

So if we look at countries, because as I understand the agreement, as we go into Paris, they talk about the ability for a country to act, the ability for a country to economically act. And some of these countries have no ability to act on this, even though they will be working into an agreement.

So can you give me an idea, just an opinion of what America will be going through as opposed to other countries on kind of a cost basis economically as we move forward with this unbinding agreement?

Mr. KNAPPENBERGER. Yes, thanks for the question. First off, I'm a client scientist, not an economist so I don't know the economy, that much of it. But what I can tell you what's going into Paris is that all the countries of the world had to turn in their—they had a homework assignment from last time to tell everyone—the rest of the world what they were going to do to address climate change. And at the end of the day when all the homework was turned it, it turns out that it's not a whole lot. It's not much different from business as usual. And so it doesn't really impact the direction the climate was going in any way.

The United States' particular plan is a little bit more aggressive than business as usual, so we'll have to put actions in place to

achieve our plan. In other major countries like India, I've seen assessments where this actually—their promises were actually less than business as usual their economy was going in any way.

So at the end of the day, whatever comes out of Paris—I seriously doubt it will be binding—is not going to impact the climate—the direction the climate is going to go into in the future, but I imagine there will be some economic impact, although, like I said, many of these countries aren't pledging much more than the direction their economy is going in any way.

Mr. KNIGHT. Thank you. And, Dr. Smith, I'm going to come to you on the same question but just a little bit more in depth because all of the articles I've read, everything that I've read that we're going into Paris, there are going to be several countries that are going to go into this and they're going to be very engaged, I'm sure, in this and then walk out of there knowing that they can't do anything, that they won't do anything, and America will probably walk out of there thinking that everyone is looking that we can do everything. What say you?

Dr. SMITH. Well, we have almost the same situation as we had with the Kyoto Protocol. Commitments were made and commitments then were found to be costly once the statesman went home and tried to say how will we implement this—these commitments. And then not all of the commitments were met.

In the case of some countries, they may not have binding regulatory programs that will force them to implement programs that they may find to be costly. In the United States we may find ourselves implementing these programs because they're part of our regulatory structure.

Mr. KNIGHT. Thank you. And, Mr. Magness, as we see, you know, our states have a little similarities with Texas and California. Some of the similarities are we're big states, we have a lot of wind, and we have a lot of sun, so there are an awful lot of possibilities for renewable energy in those states. And in California we have taken it into the nth degree with our RPS, our Renewable Portfolio Standard, that is putting a lot of our companies at a disadvantage with other states and are rising our prices of electricity quicker than most every other state.

Can you give me an idea as we move forward with this type of activity? Where is the line in the sand that we can't go any further, that the renewables have maybe taken their course and we can't get any further on renewables? We are going to have to burn something at some time when the wind is not blowing and the sun is not shining and maybe we don't have that new technology that can bridge us to that next capacity. Do you think we're getting to that point, especially in states like ours?

Mr. MAGNESS. Mr. Knight, that's a very good question, and it's an issue that ERCOT is actively investigating now. Because we're seeing, as I noted, nation-leading wind implementation, we've set a new record of over 12,600 megawatts of wind on our grid just this week.

And as I mentioned in my testimony, we welcome megawatts, whether solar, whether wind, coal, natural gas——

Mr. KNIGHT. Sure.

Mr. MAGNESS. —all of the above, but at times in order to maintain grid stability you need to be able to have something that the operators can control, something that can be dispatched like traditional thermal units. And I think often the point at which it gets trying for the operators is maybe not what you would expect, not so much the high, high peak day but the day when load is low and it needs to be balanced somehow, and only the renewables are on the grid. If those drop off quickly or go up quickly, we have to have mechanisms in place to be able to dispatch and control that.

What we've seen in ERCOT is the market construct that our legislature created in 1999, which is a deregulatory approach, has driven more wind into our state than we've seen anywhere else. It is also beginning to drive more solar investment in our state, but we've maintained a large base of gas, of coal, of nuclear resources that allow us to keep the grid balanced. And it is that balance that we need at some level in order to continue to operate reliably into the future.

Mr. KNIGHT. Thank you very much, and I appreciate the time, Mr. Chairman. I yield back.

Chairman SMITH. Thank you, Mr. Knight.

The gentleman from Texas, Mr. Babin, is recognized for his questions.

Mr. BABIN. Thank you, Mr. Chairman.

And I'd like to ask Mr. Magness a few questions. Being a Congressman from Texas, I represent the 36th District in southeast Texas, and 63 percent of our power is coming from coal-fired plants, so we have a great interest in the Clean Power Plan. But how will the Clean Power Plan affect average electricity consumers in our State, Mr. Magness?

Mr. MAGNESS. Mr. Babin, I'd say in two ways based on our studies. One is our study found that the cost of energy we would expect to increase by up to 16 percent going out into the implementation period. So just on that basis alone you'd see that sort of increase.

Mr. BABIN. Yes.

Mr. MAGNESS. Then, in addition, for example, in Texas we recently spent $6.9 billion investing in new transmission primarily to bring renewable energy that's in the rural west part of Texas into the cities and into east Texas. So those costs all have to be recovered from end-user customers as well.

When we have to buy reliability services—and they're not just the energy coming out of the plant but something in addition to keep the system stable—those costs will increase as we have to face that situation more. So all of those costs in our market ultimately roll down to the end-user consumer.

Mr. BABIN. I got you. Okay. And then second, Texas leads the nation in wind power, but EPA projects in building block 3 of the final rule that over 100 terawatt hours of renewable generation will be added in ERCOT by 2030 in addition to what exists today. Given ERCOT's experience with integrating renewables, is that a realistic estimate?

Mr. MAGNESS. Well, it's an enormous increase in what we're seeing. We currently in 2014 saw 36 terawatt hours on our system, and this is setting wind penetration records for the nation frequently.

Mr. BABIN. Right.

Mr. MAGNESS. So to—the idea of taking that up to 100 is an enormous reach to add to a system that's already doing a whole lot with renewables.

Mr. BABIN. Okay. And then the Clean Power Plan is just one part of the EPA's regulatory onslaught against Texas and other states. The EPA looks at the rule in isolation, but does Texas face a cumulative impact from this and other recent EPA rules?

Mr. MAGNESS. Yes, and the one I would cite to you most specifically is there's a regional haze program that EPA manages. We're facing a federal implementation plan on the regional haze rules that could drive out coal-fired units much more quickly than the Clean Power Plan. So we may be seeing—but part of the—as you mentioned, the cumulative impact is if you might make the investment as a unit owner to comply with regional haze, you might not make that investment as you look over the horizon——

Mr. BABIN. Certainly.

Mr. MAGNESS. —there's an increasing number of investments that would be required, and it may make it a harder decision to keep those units available while we are building the transmission and taking the other steps we need to meet the time when they're gone.

Mr. BABIN. Okay. EPA says compliance with the Clean Power Plan will not start until 2022 but could Texas start seeing the impacts much sooner than that, especially when taking into account other EPA regulations?

Mr. MAGNESS. I think for the reason we were discussing just a moment ago that you see sort of the cumulative impact of these rules and people are going to have to make very large, important investment decisions——

Mr. BABIN. Right.

Mr. MAGNESS. —in the near term, and all they can see over the horizon is difficulties in the long term.

Mr. BABIN. Last question, ERCOT's analysis of the impacts of the Clean Power Plan state that, though EPA made a number of modifications in the final rule, the most impactful for the stringency of the limits for Texas is EPA's shift to a uniform national approach for setting the standards of the final rule rather than the state-by-state approach used in the proposal. Has EPA provided state regulators with a significant degree of flexibility in determining how to comply with the Clean Power Plan, and why is a uniform approach a particular concern to Texas?

Mr. MAGNESS. Well, I think that part of the issue here is the—understanding the ERCOT interconnection, which is a—sort of a separate grid from the eastern and western interconnections. So our ability to participate in regional approaches is more complicated, I think, than a lot of other areas and produces a challenge for Texas that may not exist in other States and other regions. So that certainly ups the ante on the difficulty of taking that kind of approach.

So while there were some differences in that national approach that affected, you know, what we're seeing in the study, we think trying to manage it in that—in the way they're contemplating is

difficult, particularly when we've seen—our market, as it works, is generating a lot of the outcomes they're already looking for.

Mr. BABIN. Right.

Mr. MAGNESS. To change it doesn't make a lot of sense as far as trying to get the same objectives.

Mr. BABIN. Anyway, thank you, Mr. Magness. And I'd also like to thank all the other witnesses. We appreciate you coming today. And with that, I yield back the balance of my time, which is zero.

Chairman SMITH. Thank you, Mr. Babin.

And the gentleman from Louisiana, Mr. Abraham, is recognized.

Mr. ABRAHAM. Thank you, Mr. Chairman.

I have been watching the narrative that Ms. McCarthy has been giving as far as the CPP, and I noticed it changed somewhat in August and in late July from global warming as to the effects of the CPP or the effects of carbon to—she then went to say that it's going to exacerbate childhood asthma. And so I've been looking at this from a physician's point of view, and I really made no connection between CO_2 and child exacerbations of asthma. I've treated thousands of cases of it, and I know for a fact that most of childhood asthma is either tobacco smoke or rhinovirus or seasonal due to pollen or dust.

So I guess my question to you, Dr. Smith and Mr. Magness, what are the health disbenefits of the CPP? For instance, are many seniors in my district—and certainly I live in a very rural district where unfortunately we have a disproportionate number of—people on a low fixed income. So are the poor and the seniors going to have to choose between medicines and higher electricity cost to afford medicine? Because if they do, that affects their health directly. I can make that connection much more easily than I can with the other way with the CO_2 and the asthma exacerbations. Yes, Dr. Smith.

Dr. SMITH. Thank you. I'd just like to repeat, as I said in my oral statement, that those asthma attacks that you're referring to have nothing to do—they really have nothing to do with climate change——

Mr. ABRAHAM. And I agree. I think it's pixie dust.

Dr. SMITH. —neither in the present or the future. EPA has based them entirely on changes of—coincidental changes of other types of pollutants that are already regulated, and those other pollutants are already regulated to levels that are protective of the public health. So there's really not a credible case for arguing that there would even be those benefits to be had as these other pollutants fall coincidently in the implementation of the CPP to get the CO_2 down. But they have nothing to do with climate change.

Now, at the same time you raise the question are there some other kinds of disbenefits, health disbenefits even that may be incurred as a result of the CPP, and that would be—if—as I said before, there is—there are statistical associations found between disbenefits in health and increased spending or costs to consumers. And so those would be real as well. They would be just as real as the statistical types of calculations that are lying behind the asserted benefits of the CPP. EPA has not calculated them. And as I said, if you compare costs to benefits, you end up with the impression that the costs are actually greater than the benefits, which

would imply that there are these health disbenefits also to be had from those costs.

Mr. ABRAHAM. Mr. Magness, you have something to add, sir?

Mr. MAGNESS. Mr. Abraham, if we're not able to provide reliable electric service—that service is fundamental to people's way of life day-to-day—the way in which a grid operator protects the grid from blackouts, from a much, much worse situation occurring that could go on for a while, is to do rotating outages. We don't like to do them, but it's one of the tools we have.

What we see in our analysis is that if we are not able to get the transmission lines built in time to replace the coal units are lost, we could see, particularly, you know, localized effects in places like Dallas, places like Houston, that we may have a higher and higher risk of having to do rotating outages. When we do those rotating outages, they're not something that you can plan very much in advance because of the nature of the electric system. They affect hospitals. They affect schools. They affect where our elders are cared for.

So I think as a—you know, from the highest level, one of the reasons that electric reliability is so essential is the day-to-day health and operation of people of our economy.

Mr. ABRAHAM. Thank you.

Thank you, Mr. Chairman. I yield back.

Chairman SMITH. Thank you, Mr. Abraham.

And the gentleman from Georgia, Mr. Loudermilk, is recognized.

Mr. LOUDERMILK. Thank you——

Chairman SMITH. I'm—if the gentleman will excuse me, I skipped over someone by mistake, and it's the gentleman from Alabama, Mr. Palmer, who's up next.

Mr. PALMER. Thank you, Mr. Chairman.

And, Mr. Loudermilk, I hope you can wait five minutes. Is that okay?

Mr. LOUDERMILK. Yeah.

Mr. PALMER. Thank you. Dr. Smith, did you find any serious problems with EPA's analysis of the Clean Power Plan?

Dr. SMITH. I found that they are not reporting the costs they actually estimated, pushing those costs off into years beyond the time period when they have to report cost estimates in their Regulatory Impact Analysis.

I also found just yesterday that in their analysis of the mass-based cap they haven't actually analyzed the very rule that EPA itself has implemented or promulgated, which is that they are allowing leakage, and that causes their cost estimates to be understated.

Mr. PALMER. Does that come across to you as a bit disingenuous?

Dr. SMITH. I think that the reporting problems are a bit disingenuous. That has that appearance to me. The issue of the leakage, I'm not sure. I'm not sure how—whether it's even been noted or that they're aware that they failed to do that.

Mr. PALMER. Ms. Dykes, this is a yes or no question in regard to Mr. Abraham's points about asthma and health benefits of the Clean Power Plan. Is it your opinion—is it the EPA's opinion that it does reduce asthma rates and has a beneficial impact on health?

Ms. DYKES. It is my opinion that, yes, it does.

Mr. PALMER. Thank you. That's interesting because Administrator Gina McCarthy testified before Congress that the Clean Power Plan—and I'm quoting—"will not have any meaningful direct impact on respiratory health, atmospheric temperatures, or sea level rise," which begs the question why is EPA selling out to impose this? And her response was something that actually you testified to a little while ago, that it will encourage other nations to comply.

Mr. Knappenberger, your expertise is climate. Are you familiar with the research that's indicating that we're actually entering into a cooling period?

Mr. KNAPPENBERGER. A little bit as having to do with the solar variability and the decrease of that. That is ongoing research. I'm not sure what it will yield. But as I said, there are natural and there are human influences on the climate system, and the human influences add a pressure to warm it, but doesn't mean that you—that it will warm, as other natural influences could offset some of that warming.

Mr. PALMER. So your research is consistent with the natural variations. I think, in fact, one of the IPCC lead authors has reached that conclusion that any variation in the climate is the result of natural variations.

I also want to address this issue of the cost, and it's interesting that we've had a couple of members testify about the benefits in their states, and I would just like to point out, Mr. Chairman, that for Connecticut, they have the highest household energy costs in the country.

And in terms of the impact on low-income families, it might be interesting to look at the federal program, the Low Income Household Energy Assistance Program. Connecticut is getting 72 million a year. That's what your appropriations would be for 2016, and Massachusetts, 133 million.

So it has—it's obviously having an impact on low-income families. As a matter of fact, the National Black Chamber of Commerce indicated that if the Clean Power Plan, which they oppose, is implemented, it will cost African Americans seven million jobs, will cost Hispanics twelve million jobs, it will lower their household income by $455 per year for African Americans, 515 for Hispanic families. They estimate that the African American poverty rate will go up 23 percent, and the Hispanic poverty rate will go up 26 percent.

Dr. Smith, is this in any way consistent with some of the things that you're finding?

Dr. SMITH. In our analysis we have the RGGI region meeting—in our base case meeting its RGGI caps and the costs—basically, those costs that you're describing are embedded in our base case, and they don't even get captured into our cost analysis because we take those as already incurred. But there's no reason to believe that those costs aren't happening.

And I also want to point out that the Analysis Group study is only looking at the benefits within the states, but there are damages and costs of the RGGI program to providers of fuels that are outside of the state, and those aren't being accounted for in the Analysis Group report.

Mr. PALMER. Mr. Chairman, in wrapping up my point here, you know, you have the Administrator of the EPA admitting that it has little to no health benefit, little to no benefit in climate change. It seems like it's a massive public relations program, but really it seems like it's a political program. I yield back.

Chairman SMITH. Yes. Thank you, Mr. Palmer.

And now the gentleman from Georgia, Mr. Loudermilk, is recognized.

Mr. LOUDERMILK. Thank you, Mr. Chairman, and also to my friend from Alabama, I just—that isn't the first time that Alabama has beat Georgia this year. I'll just bring that up.

Dr. Smith, just for a few minutes here, I want to set aside hyperbole, I want to set aside tales of apocalypse of global warming, and I want to look at facts. I want to look at truth. My concern is the health and the welfare of the people of this nation, more specifically, the 11th Congressional District in Georgia.

I've looked a lot into this, and you may say I want to look at the real impact overregulation by the government is having on the health, the welfare of the people of this nation. I've testified here before of what I have seen as going throughout the state of Georgia. Let me lay it out to you.

Because of over-taxation and overregulation, many textile mills and other manufacturers that once dotted the landscape throughout Georgia that provided employment for generations of families—you had sometimes three generations of families working either in the factory or in a supporting business in a small community, a thriving small community in Georgia—those plants are now sitting empty because of the regulations that government has imposed upon them because those manufacturers have moved their operations overseas, not because of the cost of labor but because the hidden costs of overregulation and taxation.

As you go into those neighborhoods, you go into those communities, you experience low-income families struggling to get by and you find poverty-stricken families. Their health has deteriorated, disease is higher, their living conditions are deplorable. Since this administration has gone on a rampage to even further destroy economic advancement in this nation, we have seen that we're trying to come back, but every time the economy tries to recover, we see more regulation coming down the pike. We've already closed coal-fired plants in Georgia costing 700 jobs of hardworking individuals because of regulation.

Now, I read what's going to happen here. We already have some of the highest cost of electricity in Georgia. I have one of the largest coal-fired plants in the nation ten miles from my home. It is one of the cleanest. They have exceeded the standards that the EPA has already put out there, but now they're told they have to, even with a greater percentage. They can't get there because they're already employing the best technology out there. It is a very clean-operated coal-fired plant. They can't get there. It is going to shut down, costing another 2,000 jobs. We will see more of this poverty continue. When you look at the average American family is already paying $15,000 in hidden regulatory taxes, that causes them to have to take other means to get by.

As we're going to see another 17 percent, as—according to your report, a 17 percent estimated increase in the cost of electricity, I guarantee you families will supplement that electricity in the cold months by burning alternate fuel in their homes in their fireplaces. It happens every year. Every time we have a price increase, there are more home fires, there are more people burning—and I can imagine, and I've had others testify, that burning wood in a fireplace creates more carbon into the atmosphere than the footprint of a coal-fired plant does for that home.

But we know through studies that that increases asthma. The reason Gina McCarthy testified that pollution isn't a contributor to asthma because it isn't. The World Health Organization says there's not even a clear link. But indoor air pollution is.

So my question, what are we going to see on a national scale if CPP is implemented on the impact to the economy and the average working family in this nation?

Dr. SMITH. The costs that I've been reporting and estimating are average costs across the whole average consumer. And they are substantial in their own right as—but regulations are regressive. The costs of regulations, especially regulations on energy, are regressive in their impact, and that's what you've been describing. And there's no question that people, if they have a hard time meeting their electricity bill, are going to resort to sources of energy in their home warming that creates indoor air pollution, and there's no question that indoor air pollution is a bigger problem than outdoor air pollution at this time, especially open fires in homes.

Mr. LOUDERMILK. Okay. Thank you.

And, Mr. Chairman, I would love to continue on with this but I see them I am out of time so——

Chairman SMITH. If you have another question, feel free to——

Mr. LOUDERMILK. I would real quickly.

Ms. Dykes, my question to you would be are we prepared to handle the increased cases of disease, the health risks that this type of situation—I'm telling you, I'm dealing with facts, not studies that the EPA does that won't even give us the data on the studies. I'm not talking about scientific studies. You can study all day long. The facts are the reality of what's on the ground in my district across the Nation. When there is economic downturn, when there are people without jobs, poverty goes up, living conditions go down, you see pollution, you see unhealthy living conditions in the home, and health risks and go up. Are we prepared as a nation to deal with the increase of the health that this downturn of this plan will give us for, what, .03 percent decrease in global temperature?

Chairman SMITH. Yes, 2 or 3/100 of a——

Mr. LOUDERMILK. Oh, 3/100. Okay. Thank you for the correction.

Ms. DYKES. Well, I agree with you. I think that to the extent that—you know, I'm excited to talk to you today not about hypotheticals and studies but about the real experience that—the verified successes that we've had in the RGGI region through implementing for several years a program that is a model for how States can comply with the Clean Power Plan.

And, you know, you've heard from the panelists a variety of different concerns about impacts on customers, reliability impacts. We're experiencing those today because of the lack of action that's

caused increased storm volatility. We've had five major storms roll through our State in 2011, 2012 that knocked out power to 800,000 customers. We have substations that have to be built up because of storm surges now, you know, that have not been affected for decades.

And the ability to reinvest proceeds from the sale of carbon allowances is what gives us our greatest tool to help low-income customers through energy efficiency programs, to weatherize their homes and reduce their electricity bills. And so it's a very—I think those are demonstrated successes from our program.

Chairman SMITH. And I think Dr. Smith wanted to respond as well.

Dr. SMITH. It's certainly possible that when you start to tax energy, to take some of those tax revenues as Connecticut is doing and recycling them back to helping households, even low-income households to reduce the impact on their bills.

But, you know, another problem with weatherization and the like is that in fact that can increase the problem of indoor air pollution, and if people continue to try to find yet cheaper ways to meet their needs for warmth, that will continue.

Mr. LOUDERMILK. And I may conclude, Mr. Chairman, that these credits and help for low income is a good idea, but when they have no job and they can't pay their bills, period, a little bit of help doesn't go a long way.

Chairman SMITH. Thank you, Mr. Loudermilk.

That concludes our hearing today. And let me thank the witnesses again, collectively and individually, for their testimony. This was very informative, very helpful, and we appreciate the time you took to be here and the effort you put into your testimony. Thank you.

[Whereupon, at 11:47 a.m., the Committee was adjourned.]

Appendix I

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by Dr. Anne Smith

QUESTIONS FOR THE RECORD FOR DR. ANNE SMITH

U.S. House Committee on Science, Space, and Technology
The Administration's Empty Promises for the International Climate Treaty
Tuesday, December 08, 2015

Questions from the Honorable Lamar Smith (R-TX)

1. Some have argued that U.S. GDP increases as a result of major regulations, such as the Clean Power Plan. Is this argument misleading? Does correlation imply causation? Please explain.

Correlation should never be viewed as causation unless a causal mechanism can be identified. In the case of economic regulation, identifiable causal mechanisms indicate that observed correlations between rising regulatory effort and rising GDP do not imply that GDP has increased as a result of the regulations. Economic growth is caused by a mix of heightened productivity resulting from technological progress, population growth, savings behavior, and other structural attributes of an economy. Most modeling exercises that account for these causal relationships project that US GDP will grow into the future. A regulation that involves major compliance spending will demand some of the scarce capital that would otherwise be available to make productivity-enhancing investments. This, and other cost increases that result from the regulation, impose a structural constraint on the amount of growth that would otherwise occur. The same types of modeling thus predict a reduced rate of growth compared to a world without the regulation, as the outcome of a causal chain of events. I am unaware of any environmental regulation that has been predicted to have a larger negative effect on growth than the underlying forces driving growth, which would be necessary to observe absolute declines in GDP as a result of regulatory effort. Rather, the regulatory impact analyses have predicted only a slowing in the rate of growth in GDP. Thus, projections of economic impacts from major regulations also project that GDP and regulatory effort will rise simultaneously, but this correlation does not mean that regulation causes the GDP growth. Causal reasoning tells us that GDP could have been higher still, were it not for the emissions reductions (or other indicator of regulatory effort). That unobservable reduction in growth due to the regulation, is the real cost to consumers, and it is no less real just because it cannot be directly observed.

2. How strong is the claim that a transition to a clean energy economy would prevent thousands of asthma attacks and saving hundreds of lives? How reliable are the underlying studies, and how confident can we be regarding these claims? Are there any confounding effects that are not being considered?

The purpose of a regulation to reduce CO_2, such as the CPP, is to reduce potential climate change risks, yet the health benefits mentioned here (which are reported in the CPP's Regulatory Impact Analysis) are due neither to potential climate change nor to ambient CO_2. They are entirely based on projections of tiny changes in the ambient levels of two common non-greenhouse pollutants, $PM_{2.5}$ and ozone, which are categorized as criteria pollutants. The Clean Air Act requires EPA to set health-protective standards known as the National Ambient Air Quality Standards (NAAQS) for each criteria pollutant. The public health is viewed as protected (with a margin of safety) from harmful effects of a criteria pollutant in any area that

meets the NAAQS that EPA has set. This fact is important for understanding why the claim that the CPP will prevent thousands of asthma attacks and save hundreds of lives is unreliable and should be given little to no credence. EPA based its estimates of those health effects on small incremental reductions in $PM_{2.5}$ and ozone that it predicts will coincidentally result from closures of power plants that retire and other changes to meet the CO_2 targets. In EPA's CPP benefits analysis, almost all of those coincidental reductions of ambient $PM_{2.5}$ and ozone occur in areas already meeting the NAAQS. If EPA had any confidence that public health is at risk when exposed to those areas' low $PM_{2.5}$ and ozone levels, it would be required by the Clean Air Act to set the NAAQS below those levels. Thus, these health benefits estimates are highly unreliable and low-confidence in nature. Even if EPA were to start to have some confidence in their existence, then they would occur even without the CPP, because they would be required under a more stringent NAAQS. A more thorough discussion of this issue is available in a peer-reviewed paper that I recently completed, and which will appear in the journal Risk Analysis. Titled "Inconsistencies in Risk Analyses for Ambient Air Pollutant Regulations," it is available in online early-view at http://onlinelibrary.wiley.com/doi/10.1111/risa.12517/full.

3. Are we reaching a point where further development and implementation of technologies to reduce air pollution would cost a prohibitive amount? Would the benefit outweigh the cost? Was this the situation in the early 1970's when the Clean Air Act was passed by Congress? Please explain.

In almost any pollution situation, as a pollutant's emissions or atmospheric concentrations are reduced towards zero, the cost of each additional increment of control tends to rise. Similarly, the benefit of each increment of reduction tends to fall. Inevitably, there is some amount of residual pollution for which cost of further control outweighs the benefit. In the early 1970s, pollution was much higher for the most common pollutants such as criteria pollutants (i.e., ozone, particulate matter, SO2, lead, NOx). As a result of almost 50 years of steady increases in controls, our society has moved much closer to the point where incremental benefits may be less than incremental costs. Whether we are at that point, however, depends on the specific pollutant and the specific location. That point can also change over time, especially if there is a discrete technological shift that makes more control much less costly, or a demographic shift that places greater opportunity cost on controls. The point can also change (in either direction) if new scientific information shows risks at today's much lower exposure levels are on either end of the current wide spectrum of uncertainty. For criteria pollutants, given present scientific knowledge, I believe there are many areas of the country where further control effort is not currently a sound use of societal resources. Such a situation can arise even if further control effort is not "prohibitively" costly.

4. Some have argued that the Clean Power would create jobs through the so-called green energy-technology sector. Would the number of these "green jobs" materialize fast enough to replace the potential jobs lost from the Clean Power Plan?

Employment impacts have many dimensions. One of those dimensions is temporal, but other dimensions are locational and occupational, and this could be the more important consideration from an employment disruption perspective. Even if a sufficient number of jobs might be created in the near term for energy efficiency and renewable sector projects to offset those that might be lost from the fossil fuel sector, there will likely be significant mismatch in the locations of the openings and the layoffs, and significant mismatch in the types of skill sets demanded

versus entering the job market. The long-run concern with employment impacts is whether the average worker will lose earning power. NERA's macroeconomic analyses of long-run equilibrium changes indicate a net reduction in average earnings per worker from the CPP, even after accounting for greater employment commonly referred to as "green jobs." Much of that negative impact is borne by workers in sectors other than the energy sector, and it reflects the generalized reduction in productivity that I described in my response to question 1 above.

5. In her written testimony, Ms. Dykes states that: "In Connecticut, as of 2012 we have achieve a ten percent reduction in emissions from 1990 levels economy-wide, while our population has grown nine percent, and our GDP increased by 41 percent". It appears she is implying that this increase in population and GDP is attributable to her state's participation in various environmental programs. Are there other factors that contributed to CT's increase in GDP, and how does this increase in GDP compare with other states both within RGGI and throughout the nation?

Ms. Dykes's statement is an example of the misleading suggestion discussed in Question 1 above that the growth in population and GDP in Connecticut were somehow caused by the emissions reduction. As I explained in my response to Question 1, the real question is whether Connecticut's growth might have been even larger but for their emissions reductions efforts. Whether GDP growth would have been higher is not observable, but causal reasoning implies it is likely the case. However, there are other aspects of the Connecticut situation that make it inappropriate to generalize to other states or to CPP compliance. First, much of the RGGI compliance was achieved by shifting away from consumption of coal and natural gas – both of which are resources that RGGI states were importing (either directly or in the form of fossil-fueled electricity generated outside of RGGI). When the Analysis Group estimated gains from RGGI, its analysis did not consider the extent of economic losses incurred by entities in states outside of RGGI. The problem with a partial impact analysis of the sort done by the Analysis Group is that the CPP will affect all states, and a national economic impact analysis is needed to reflect all these impacts, losses as well as gains. A second issue is that the required emission reductions have been smaller for the RGGI cap to date than the reductions called for in the CPP. Indeed, for most of its existence, the RGGI cap has not even been binding, and its allowance prices were routinely set by a regulatory price floor of about $2 per ton of CO_2. Allowance prices are projected to be much higher than $2 per ton in NERA modeling of the CPP caps, including in RGGI states if they participate in trading with non-RGGI states. Third, because the RGGI region is interconnected with large generating states that are not subject to the RGGI cap, there is a significant possibility that much of the emissions reductions claimed by RGGI have actually "leaked" to surrounding states who then sell electricity back to the RGGI states. This phenomenon of leakage can keep the costs of meeting a cap low for the capped states such as Connecticut while leaving an overstated appearance how much the capped states have actually reduced their global carbon footprint. Under the CPP, potential routes of interstate leakage will be blocked, and RGGI states may face higher costs to meet their targets than they have experienced so far.

Questions from the Honorable Darin LaHood (R-IL)

1. Analysis from Energy Ventures Analysis finds that the Clean Power Plan will cost consumers an additional $214 billion for electricity between 2022 and 2030. Forty-six states will face

double digit increases in wholesale electricity prices with 16 states, including Illinois, incurring a 25+ percent increase by 2030. Dr. Smith, NERA has also done extensive research on the Clean Power Plan. Do you agree that Illinois households and businesses will be a less secure in a more expensive energy future?

NERA has estimated average retail electricity rate increases by state (not wholesale prices). Also, the percentage increase depends on projected electricity rates in the baseline without a CPP implemented. In NERA's analysis (as with EPA's), incremental energy efficiency projects were not included in the baseline. NERA's analysis projects double-digit percentage increases in retail rates in IL averaged over the years 2022 to 2031. In terms of retail rate impacts, IL is somewhat worse than average in our analysis, over a variety of implementation assumptions. Price impacts such as these do suggest a more expensive future, although those costs may appear in many aspects of life besides energy bills. NERA's analysis estimated net impacts to consumers as a whole, after accounting for recycling of all allowance value, savings in electricity consumption, and increased demand in energy efficiency and in the renewables sectors. On a national scale, the net cost to consumer's spending power was about $64 billion to $79 billion. (We have not done an analysis for IL impacts specifically, other than the retail electricity rate impacts described above.)

2. In addition to the unprecedented spike in electricity rates, EPA's plan will strand existing power plant investments and require $64 billion to replace an estimated 41,000 megawatts (MW) of power plant capacity forced to close prematurely. The required capital investment cost for Illinois to comply with the rule is an estimated $2.307 billion. Dr. Smith, who is expected to cover these additional costs? Won't consumers ultimately be left to foot the bill?

Costs of a regulation ultimately come back to consumers. Some consumers bear larger costs than others. The average consumer bears larger costs in some states than in others. Some groups of consumers may even benefit from these costs. However, consumers as a whole will foot the bill of the CPP, and the average consumer will face a net cost. This cost will come back to consumers in the form of higher electricity rates to pay for more expensive sources of electricity, and to pay for the costs of their utility's spending on energy efficiency projects if used to reduce the replacement capacity need from coal plant retirements. Consumers will also have to directly foot the bill for their share of the costs of energy efficiency spending. Electricity bills may not fall as much as anticipated because consumers' rates will have to be increased to pay for the unchanged (or potentially increased) costs of electricity transmission and distribution infrastructure spread over fewer kilowatt-hours (kWh). Ultimately, the greater spending per kWh and the investments to replace functional power plant capital will also reduce the productivity of the economy as a whole, and that will translate into a lesser growth in consumer welfare in the future.

Responses by Mr. Bill Magness

QUESTIONS FOR THE RECORD
The Honorable Lamar Smith (R-TX)
U.S. House Committee on Science, Space, and Technology

The Administration's Empty Promises for the International Climate Treaty

Wednesday, May 18, 2016

Questions for Mr. Bill Magness

1. In Texas, electricity demand is forecasted to increase by 24% over the next 20 years, while emissions reduction goals of 33% have been set by the EPA's Clean Power Plan (CPP). Nuclear energy currently plays a role with four nuclear units providing 60% of Texas' carbon-free electricity and 10% of the state's overall electricity. What role will nuclear energy have in Texas's future energy mix? Given that coal units will need to retire under the Clean Power Plan, can nuclear energy provide more of and replace Texas's future energy needs given that it currently has only four nuclear units?

Nuclear power is an important component of the current ERCOT resource mix, representing 4,981 MW of summer capacity and providing ~39 TWh of electricity in 2014 (11.6% of total ERCOT energy). Due to the low variable cost of nuclear power generation, the four nuclear units in ERCOT already operate at or near full availability. These existing units do not have the ability to provide additional electricity to the grid beyond what they provide today. Regarding future nuclear capacity, in the ERCOT competitive market generation development is driven by market forces. Current market economics and regulatory incentives do not appear to support construction of new nuclear capacity in the ERCOT region. However, as conditions change market participants will make decisions about the construction of new capacity in the ERCOT region based on their projections of market economics, government policies, and other factors.

Appendix II

Additional Material for the Record

npr

China's Greenhouse Gases Don't Seem To Trouble Most Of Its Citizens

Updated November 30, 2015 11:11 AM ET
Published November 24, 2015 3:39 PM ET

China is the world's biggest greenhouse gas emitter and drives climate change more than any other country. As the world warms and seas rise, researchers say it stands to lose more heavily populated coastline as well.

Most Chinese, though, don't seem to see climate change as a current threat.

"I'm not really concerned because I think the distant future has little to do with me, because I'll already be dead," said a woman named Yu, who didn't want to give her full name in case government officials didn't like her comments.

Yu, who is in her 50s, spoke last week as she scanned her smartphone in Shanghai's People's Park. She said many Chinese share her thinking.

"Ordinary folks don't have a lot of vision," she said. "They are only interested in what's in front of their eyes."

At the end of this month, representatives from countries across the globe — including China and the U.S. — will meet in Paris to discuss ways to slow global climate change. Despite China's heavy contribution to the problem, most people here don't seem particularly worried about it. A recent survey by the Pew Research Center found only 18 percent of Chinese said they were very concerned about climate change.

"The Chinese are the least intensely concerned of any of the populations of the 40 countries we surveyed," says Bruce Stokes, director of global attitudes at the Pew Research Center. "We did a 20-country survey asking the very same question five years ago and they were the least concerned then as well."

Stokes can't fully explain this disconnect, but he has discussed it with French climate negotiators who work closely with their counterparts in China's government. The French negotiators say that until recently, the Communist Party and its massive propaganda machine treated air pollution and climate change as separate issues.

"The messaging strategy of the government has been very conscious to say, 'Yes, we acknowledge there's air pollution, we're trying to deal with it, but this has nothing to do with climate change, that's a Western problem,'" said Stokes, paraphrasing the French negotiators.

China built a dirty industrial model that drove spectacular economic growth for more than two decades, but it's been shifting away from that formula for both economic and environmental reasons. Last November, the government announced for the first time that emissions here would peak around 2030.

Xie Zhenhua, a government climate official, says the Chinese are more focused on air pollution than climate change because the former is so present in their lives.

"People feel the impact of smog firsthand," Xie said at a news conference in Beijing last week. "Actually, people haven't yet felt the danger posed by global warming."

But climate scientists say they will — especially here in Shanghai.

If emissions continue to grow unchecked, global temperatures will rise by 4 degrees Celsius — a little more than 7 degrees Fahrenheit — by the end of this century, warnsBenjamin Strauss of Climate Central, an independent organization of scientists and journalists focused on climate change.
Strauss says that will cause seas to rise, eventually affecting 145 million people along China's crowded coast. "Shanghai has by far the largest number of people on land who would be submerged in a 4-degree sea-warming scenario," Strauss says, "almost twice as many as the next-largest urban area, which happens to be Tianjin, also in China."

Climate Central estimates water would flood most of Shanghai's financial district, home to some of the world's tallest skyscrapers. Chang, a 27-year-old who sells wealth products here, would hate to see that happen.
"Of course I'm worried," says Chang, who — like everyone else interviewed for this story — wouldn't give his full name. "If a great city like Shanghai is no longer, it will be a shame, right?"

Others, though, seem unfazed. Scientists say the flooding could occur slowly over time. Most people in Shanghai tend to focus on commerce and their immediate lives.

An art student named Hu said he'd read about the threat. "Actually, there are many reports like this," he says. "I don't take them seriously. My classmates and friends pay little attention to this issue, because it has zero relevance to our majors."

THE WALL STREET JOURNAL.

http://www.wsj.com/articles/climate-science-is-not-settled-1411143565

THE SATURDAY ESSAY

Climate Science Is Not Settled

We are very far from the knowledge needed to make good climate policy, writes leading scientist Steven E. Koonin

The crucial scientific question for policy isn't whether the climate is changing. That is a settled matter: The climate has always changed and always will. *MITCH DOBROWNER*

By **STEVEN E. KOONIN**

Sept. 19, 2014 12:19 p.m. ET

The idea that "Climate science is settled" runs through today's popular and policy discussions. Unfortunately, that claim is misguided. It has not only distorted our public and policy debates on issues related to energy, greenhouse-gas emissions and the environment. But it also has inhibited the scientific and policy discussions that we need

to have about our climate future.

My training as a computational physicist—together with a 40-year career of scientific research, advising and management in academia, government and the private sector—has afforded me an extended, up-close perspective on climate science. Detailed technical discussions during the past year with leading climate scientists have given me an even better sense of what we know, and don't know, about climate. I have come to appreciate the daunting scientific challenge of answering the questions that policy makers and the public are asking.

The crucial scientific question for policy isn't whether the climate is changing. That is a settled matter: The climate has always changed and always will. Geological and historical records show the occurrence of major climate shifts, sometimes over only a few decades. We know, for instance, that during the 20th century the Earth's global average surface temperature rose 1.4 degrees Fahrenheit.

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Nor is the crucial question whether humans are influencing the climate. That is no hoax: There is little doubt in the scientific community that continually growing amounts of greenhouse gases in the atmosphere, due largely to carbon-dioxide emissions from the conventional use of fossil fuels, are influencing the climate. There is also little doubt that the carbon dioxide will persist in the atmosphere for several centuries. The impact today of human activity appears to be comparable to the intrinsic, natural variability of the climate system itself.

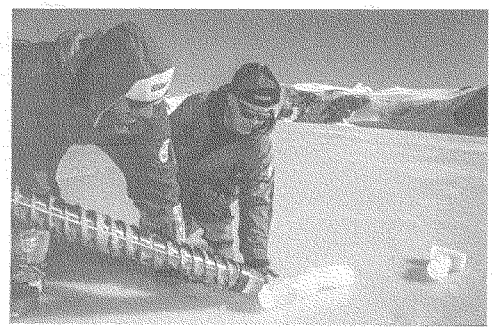
Rather, the crucial, unsettled scientific question for policy is, "How will the climate change over the next century under both natural and human influences?" Answers to that question at the global and regional levels, as well as to equally complex questions of how ecosystems and human activities will be affected, should inform our choices about energy and infrastructure.

But—here's the catch—those questions are the hardest ones to answer. They challenge, in a fundamental way, what science can tell us about future climates.

Even though human influences could have serious consequences for the climate, they are physically small in relation to the climate system as a whole. For example, human additions to carbon dioxide in the atmosphere by the middle of the 21st century are expected to directly shift the atmosphere's natural greenhouse effect by only 1% to 2%. Since the climate system is highly variable on its own, that smallness sets a very high bar for confidently projecting the consequences of human influences.

A second challenge to "knowing" future climate is today's poor understanding of the oceans. The oceans, which change over decades and centuries, hold most of the climate's heat and strongly influence the atmosphere. Unfortunately, precise, comprehensive observations of the oceans are available only for the past few decades; the reliable record is still far too short to adequately understand how the oceans will change and how that will affect climate.

A third fundamental challenge arises from feedbacks that can dramatically amplify or mute the climate's response to human and natural influences. One important feedback, which is thought to approximately double the direct heating effect of carbon dioxide, involves water vapor, clouds and temperature.



Scientists measure the sea level of the Ross Sea in Antarctica. *NATIONAL GEOGRAPHIC/GETTY IMAGES*

But feedbacks are uncertain. They depend on the details of processes such as evaporation and the flow of radiation through clouds. They cannot be determined confidently from the basic laws of physics and chemistry, so they must be verified by precise, detailed observations that are, in many cases, not yet available.

Beyond these observational challenges are those posed by the complex computer models used to project future climate. These massive programs attempt to describe the dynamics and interactions of the various components of the Earth system—the atmosphere, the oceans, the land, the ice and the biosphere of living things. While some parts of the models rely on well-tested physical laws, other parts involve technically informed estimation. Computer modeling of complex systems is as much an art as a science.

For instance, global climate models describe the Earth on a grid that is currently limited

by computer capabilities to a resolution of no finer than 60 miles. (The distance from New York City to Washington, D.C., is thus covered by only four grid cells.) But processes such as cloud formation, turbulence and rain all happen on much smaller scales. These critical processes then appear in the model only through adjustable assumptions that specify, for example, how the average cloud cover depends on a grid box's average temperature and humidity. In a given model, dozens of such assumptions must be adjusted ("tuned," in the jargon of modelers) to reproduce both current observations and imperfectly known historical records.

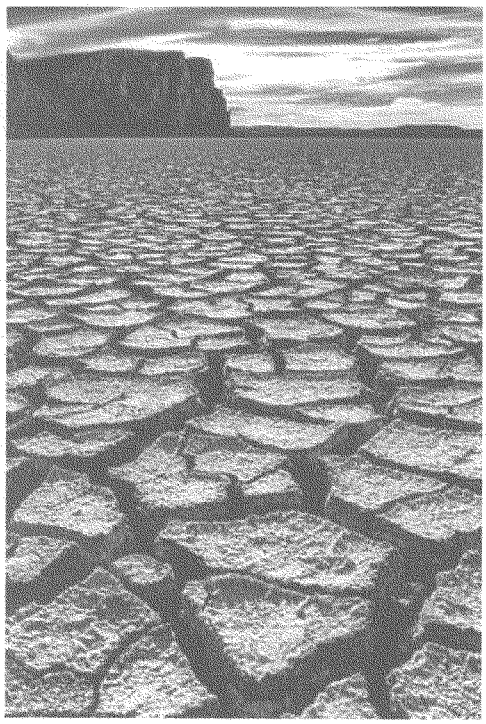
We often hear that there is a "scientific consensus" about climate change. But as far as the computer models go, there isn't a useful consensus at the level of detail relevant to assessing human influences. Since 1990, the United Nations Intergovernmental Panel on Climate Change, or IPCC, has periodically surveyed the state of climate science. Each successive report from that endeavor, with contributions from thousands of scientists around the world, has come to be seen as the definitive assessment of climate science at the time of its issue.

For the latest IPCC report (September 2013), its Working Group I, which focuses on physical science, uses an ensemble of some 55 different models. Although most of these models are tuned to reproduce the gross features of the Earth's climate, the marked differences in their details and projections reflect all of the limitations that I have described. For example:

• The models differ in their descriptions of the past century's global average surface temperature by more than three times the entire warming recorded during that time. Such mismatches are also present in many other basic climate factors, including rainfall, which is fundamental to the atmosphere's energy balance. As a result, the models give widely varying descriptions of the climate's inner workings. Since they disagree so markedly, no more than one of them can be right.

• Although the Earth's average surface temperature rose sharply by 0.9 degree Fahrenheit during the last quarter of the 20th century, it has increased much more slowly for the past 16 years, even as the human contribution to atmospheric carbon dioxide has risen by some 25%. This surprising fact demonstrates directly that natural influences and variability are powerful enough to counteract the present warming influence exerted by human activity.

Yet the models famously fail to capture this slowing in the temperature rise. Several dozen different explanations for this failure have been offered, with ocean variability



There is little doubt in the scientific community that continually growing amounts of greenhouse gases in the atmosphere, due largely to carbon-dioxide emissions from the conventional use of fossil fuels, are influencing the climate. Pictured, an estuary in Patgonia. *GALLERY STOCK*

most likely playing a major role. But the whole episode continues to highlight the limits of our modeling.

• The models roughly describe the shrinking extent of Arctic sea ice observed over the past two decades, but they fail to describe the comparable growth of Antarctic sea ice, which is now at a record high.

• The models predict that the lower atmosphere in the tropics will absorb much of the heat of the warming atmosphere. But that "hot spot" has not been confidently observed, casting doubt on our understanding of the crucial feedback of water vapor on

temperature.

• Even though the human influence on climate was much smaller in the past, the models do not account for the fact that the rate of global sea-level rise 70 years ago was as large as what we observe today—about one foot per century.

• A crucial measure of our knowledge of feedbacks is climate sensitivity—that is, the warming induced by a hypothetical doubling of carbon-dioxide concentration. Today's best estimate of the sensitivity (between 2.7 degrees Fahrenheit and 8.1 degrees Fahrenheit) is no different, and no more certain, than it was 30 years ago. And this is despite an heroic research effort costing billions of dollars.

These and many other open questions are in fact described in the IPCC research reports, although a detailed and knowledgeable reading is sometimes required to discern them. They are not "minor" issues to be "cleaned up" by further research. Rather, they are deficiencies that erode confidence in the computer projections. Work to resolve these shortcomings in climate models should be among the top priorities for climate research.

Yet a public official reading only the IPCC's "Summary for Policy Makers" would gain little sense of the extent or implications of these deficiencies. These are fundamental challenges to our understanding of human impacts on the climate, and they should not be dismissed with the mantra that "climate science is settled."

While the past two decades have seen progress in climate science, the field is not yet mature enough to usefully answer the difficult and important questions being asked of it. This decidedly unsettled state highlights what should be obvious: Understanding climate, at the level of detail relevant to human influences, is a very, very difficult problem.

We can and should take steps to make climate projections more useful over time. An international commitment to a sustained global climate observation system would generate an ever-lengthening record of more precise observations. And increasingly powerful computers can allow a better understanding of the uncertainties in our models, finer model grids and more sophisticated descriptions of the processes that occur within them. The science is urgent, since we could be caught flat-footed if our understanding does not improve more rapidly than the climate itself changes.

A transparent rigor would also be a welcome development, especially given the momentous political and policy decisions at stake. That could be supported by regular,

independent, "red team" reviews to stress-test and challenge the projections by focusing on their deficiencies and uncertainties; that would certainly be the best practice of the scientific method. But because the natural climate changes over decades, it will take many years to get the data needed to confidently isolate and quantify the effects of human influences.

Policy makers and the public may wish for the comfort of certainty in their climate science. But I fear that rigidly promulgating the idea that climate science is "settled" (or is a "hoax") demeans and chills the scientific enterprise, retarding its progress in these important matters. Uncertainty is a prime mover and motivator of science and must be faced head-on. It should not be confined to hushed sidebar conversations at academic conferences.

Society's choices in the years ahead will necessarily be based on uncertain knowledge of future climates. That uncertainty need not be an excuse for inaction. There is well-justified prudence in accelerating the development of low-emissions technologies and in cost-effective energy-efficiency measures.

But climate strategies beyond such "no regrets" efforts carry costs, risks and questions of effectiveness, so nonscientific factors inevitably enter the decision. These include our tolerance for risk and the priorities that we assign to economic development, poverty reduction, environmental quality, and intergenerational and geographical equity.

Individuals and countries can legitimately disagree about these matters, so the discussion should not be about "believing" or "denying" the science. Despite the statements of numerous scientific societies, the scientific community cannot claim any special expertise in addressing issues related to humanity's deepest goals and values. The political and diplomatic spheres are best suited to debating and resolving such questions, and misrepresenting the current state of climate science does nothing to advance that effort.

Any serious discussion of the changing climate must begin by acknowledging not only the scientific certainties but also the uncertainties, especially in projecting the future. Recognizing those limits, rather than ignoring them, will lead to a more sober and ultimately more productive discussion of climate change and climate policies. To do otherwise is a great disservice to climate science itself.

Dr. Koonin was undersecretary for science in the Energy Department during President Barack Obama's first term and is currently director of the Center for Urban Science and Progress at New York University. His previous positions include professor of theoretical

physics and provost at Caltech, as well as chief scientist of BP, where his work focused on renewable and low-carbon energy technologies.

2016 Initial CR Release of LIHEAP Block Grant Funds to States and Territories
Continuing Appropriations Act, 2016 (P.L. 114-53)

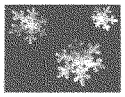
STATE	INITIAL NET STATE CR RELEASE	TRIBAL SET-ASIDES CR RELEASE	TOTAL INITIAL CR RELEASE (INCLUDING TRIBAL AWARDS)
Alabama	$38,786,441	$232,359	$39,018,800
Alaska	$9,179,392	$6,535,606	$15,714,998
Arizona	$18,011,603	$858,354	$18,869,957
Arkansas	$24,986,196		$24,986,196
California	$158,222,697	$624,864	$158,847,561
Colorado	$43,891,574		$43,891,574
Connecticut	$72,346,318		$72,346,318
Delaware	$11,280,002		$11,280,002
District of Columbia	$9,329,650		$9,329,650
Florida	$61,729,709	$9,684	$61,739,393
Georgia	$48,814,457		$48,814,457
Hawaii	$4,915,886		$4,915,886
Idaho	$17,091,086	$871,642	$17,962,728
Illinois	$148,883,228		$148,883,228
Indiana	$67,404,146	$5,998	$67,410,144
Iowa	$47,774,472		$47,774,472
Kansas	$28,576,003	$40,500	$28,616,503
Kentucky	$41,862,305		$41,862,305
Louisiana	$37,895,325		$37,895,325
Maine	$33,574,080	$1,273,687	$34,847,767
Maryland	$64,818,928		$64,818,928
Massachusetts	$133,235,051	$106,673	$133,341,724
Michigan	$140,599,015	$752,560	$141,351,575
Minnesota	$101,835,813		$101,835,813
Mississippi	$25,996,427	$53,117	$26,049,544
Missouri	$65,661,727		$65,661,727
Montana	$17,386,126	$3,683,012	$21,069,138
Nebraska	$26,370,095	$16,200	$26,386,295
Nevada	$8,862,657		$8,862,657
New Hampshire	$23,655,093		$23,655,093
New Jersey	$113,874,886		$113,874,886
New Mexico	$15,950,273	$871,281	$16,821,554

STATE	INITIAL NET STATE CR RELEASE	TRIBAL SET-ASIDES CR RELEASE	TOTAL INITIAL CR RELEASE (INCLUDING TRIBAL AWARDS)
New York	$325,975,905	$176,920	$326,152,825
North Carolina	$76,400,708	$1,383,336	$77,784,044
North Dakota	$17,394,468	$5,492,990	$22,887,458
Ohio	$131,709,468		$131,709,468
Oklahoma	$29,060,185	$3,996,103	$33,056,288
Oregon	$31,376,599	$581,163	$31,957,762
Pennsylvania	$182,170,381		$182,170,381
Rhode Island	$23,271,250	$39,822	$23,311,072
South Carolina	$30,988,879		$30,988,879
South Dakota	$15,616,303	$2,972,323	$18,588,626
Tennessee	$50,309,105		$50,309,105
Texas	$102,713,750		$102,713,750
Utah	$21,100,884	$298,849	$21,399,733
Vermont	$17,048,543		$17,048,543
Virginia	$75,277,535		$75,277,535
Washington	$50,670,377	$1,895,735	$52,566,112
West Virginia	$25,927,056		$25,927,056
Wisconsin	$91,666,854		$91,666,854
Wyoming	$8,286,096	$281,887	$8,567,983
Total to States	**$2,969,765,007**		
Total to All Tribes		**$33,054,665**	
Total to States and Tribes			**$3,002,819,672**
Territories			
American Samoa*	$249,620		$249,620
Guam*	$547,283		$547,283
Northern Mariana Islands*	$190,086		$190,086
Puerto Rico	$13,585,040		$13,585,040
Virgin Islands*	$517,516		$517,516
Total to Territories	**$15,089,545**		**$15,089,545**
GRAND TOTAL:	**$2,984,854,552**	**$33,054,665**	**$3,017,909,217**

Print

Global Cooling is Here

By Prof. Don J. Easterbrook
Global Research, September 26, 2015
Department of Geology, Western Washington University and Global Research 2 November 2008
Url of this article:
http://www.globalresearch.ca/global-cooling-is-here/10783



Global Research Editor's note

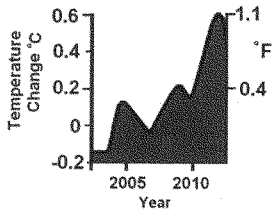
The following article represents an alternative view and analysis of global climate change, which challenges the dominant Global Warming Consensus.

Global Research does not necessarily endorse the proposition of "Global Cooling", nor does it accept at face value the Consensus on Global Warming. Our purpose is to encourage a more balanced debate on the topic of global climate change.

[Article originally published by Global Research in November 2008]

INTRODUCTION

Despite no global warming in 10 years and recording setting cold in 2007-2008, the Intergovernmental Panel on Climatic Change (IPCC) and computer modelers who believe that CO2 is the cause of global warming still predict the Earth is in store for catastrophic warming in this century. IPCC computer models have predicted global warming of 1° F per decade and 5-6° C (10-11° F) by 2100 (Fig. 1), which would cause global catastrophe with ramifications for human life, natural habitat, energy and water resources, and food production. All of this is predicated on the *assumption* that global warming is caused by increasing atmospheric CO2 and that CO2 will continue to rise rapidly.



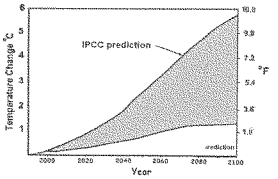


Figure 1. A. IPCC prediction of global warming early in the 21st century. B. IPCC prediction of global warming to 2100. (Sources: IPCC website)

However, records of past climate changes suggest an altogether different scenario for the 21st century. Rather than drastic global warming at a rate of 0.5 ° C (1° F) per decade, historic records of past natural cycles suggest global cooling for the first several decades of the 21st century to about 2030, followed by global warming from about 2030 to about 2060, and renewed global cooling from 2060 to 2090 (Easterbrook, D.J., 2005, 2006a, b, 2007, 2008a, b); Easterbrook and Kovanen, 2000, 2001). Climatic fluctuations over the past several hundred years suggest ~30 year climatic cycles of global warming and cooling, on a general rising trend from the Little Ice Age.

PREDICTIONS BASED ON PAST CLIMATE PATTERNS

Global climate changes have been far more intense (12 to 20 times as intense in some cases) than the global warming of the past century, and they took place in as little as 20–100 years. Global warming of the past century (0.8° C) is virtually insignificant when

compared to the magnitude of at least 10 global climate changes in the past 15,000 years. None of these sudden global climate changes could possibly have been caused by human CO2 input to the atmosphere because they all took place long before anthropogenic CO2 emissions began. The cause of the ten earlier 'natural' climate changes was most likely the same as the cause of global warming from 1977 to 1998.

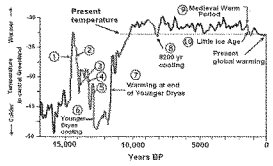


Figure 2. Climate changes in the past 17,000 years from the GISP2 Greenland ice core. Red = warming, blue = cooling. (Modified from Cuffy and Clow, 1997)

Climatic fluctuations over the past several hundred years suggest ~30 year climatic cycles of global warming and cooling (Figure 3) on a generally rising trend from the Little Ice Age about 500 years ago.

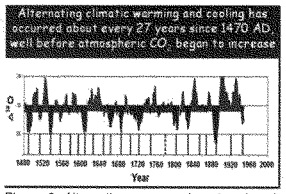


Figure 3. Alternating warm and cool cycles since 1470 AD. Blue = cool, red = warm. Based on oxygen isotope ratios from the GISP2 Greenland ice core.

Relationships between glacial fluctuations, the Pacific Decadal Oscillation, and global climate change.

After several decades of studying alpine glacier fluctuations in the North Cascade Range, my research showed a distinct pattern of glacial advances and retreats (the Glacial Decadal Oscillation, GDO) that correlated well with climate records. In 1992, Mantua published the Pacific Decadal Oscillation curve showing warming and cooling of the Pacific Ocean that correlated remarkably well with glacial fluctuations. Both the GDA and the PDO matched global temperature records and were obviously related (Fig. 4). All but the latest 30 years of changes occurred prior to significant CO2 emissions so they were clearly unrelated to atmospheric CO2.

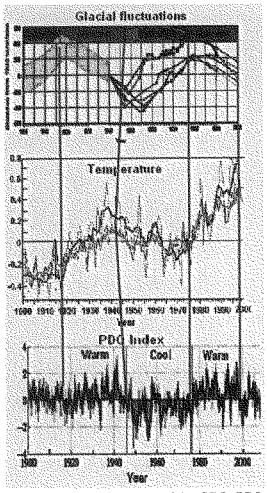


Figure 4. Correspondence of the GDO, PDO, and global temperature variations.

The significance of the correlation between the GDO, PDO, and global temperature is that once this connection has been made, climatic changes during the past century can be understood, and the pattern of glacial and climatic fluctuations over the past millennia can be reconstructed. These patterns can then be used to project climatic changes in the future. Using the pattern established for the past several hundred years, in 1998 I projected the temperature curve for the past century into the next century and came up with curve 'A' in Figure 5 as an approximation of what might be in store for the world if the pattern of past climate changes continued. Ironically, that prediction was made in the warmest year of the past three decades and at the acme of the 1977-1998 warm period. At that time, the projected curved indicated global cooling beginning about 2005 ± 3-5 years until about 2030, then renewed warming from about 2030 to about 2060 (unrelated to CO2—just continuation of the natural cycle), then another cool period from about 2060 to about 2090. This was admittedly an approximation, but it was radically different from the 1° F per decade warming called for by the IPCC. Because the prediction was so different from the IPCC prediction, time would obviously show which projection was ultimately correct.

Now a decade later, the global climate has *not* warmed 1° F as forecast by the IPCC but has cooled slightly until 2007-08 when global temperatures turned sharply downward. In 2008, NASA satellite imagery (Figure 6) confirmed that the Pacific Ocean had switched from the warm mode it had been in since 1977 to its cool mode, similar to that of the 1945-1977 global cooling period. The shift strongly suggests that the next several decades will be cooler, not warmer as predicted by the IPCC.

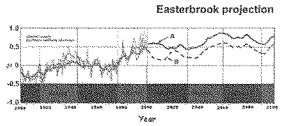


Figure 5.Global temperature projection for the coming century, based on warming/cooling cycles of the past several centuries. 'A' projection based on assuming next cool phase will be similar to the 1945-1977 cool phase. 'B' projection based on assuming next cool phase will be similar to the 1880-1915 cool phase. The predicted warm cycle from 2030 to 2060 is based on projection of the 1977 to 1998 warm phase and the cooling phase from 2060 to 2090 is based on projection of the 1945 to 1977 cool cycle.

Implications of PDO, NAO, GDO, and sun spot cycles for global climate in coming decades

The IPCC prediction of global temperatures, 1° F warmer by 2011 and 2° F by 2038 (Fig. 1), stand little chance of being correct. NASA's imagery showing that the Pacific Decadal Oscillation (PDO) has shifted to its cool phase is right on schedule as predicted by past climate and PDO changes (Easterbrook, 2001, 2006, 2007). The PDO typically lasts 25-30 years and assures North America of cool, wetter climates during its cool phases and warmer, drier climates during its warm phases. The establishment of the cool PDO, together with similar cooling of the North Atlantic Oscillation (NAO), virtually assures several decades of global cooling and the end of the past 30-year warm phase. It also means that the IPCC predictions of catastrophic global warming this century were highly inaccurate.

The switch of PDO cool mode to warm mode in 1977 initiated several decades of global warming. The PDO has now switched from its warm mode (where it had been since 1977) into its cool mode. As shown on the graph above, each time this had happened in the past century, global temperature has followed. The upper map shows cool ocean temperatures in blue (note the North American west coast). The lower diagram shows how the PDO has switched back and forth from warm to cool modes in the past century, each time causing global temperature to follow. Comparisons of historic global climate warming and cooling over the past century with PDO and NAO oscillations, glacial fluctuations, and sun spot activity show strong correlations and provide a solid data base for future climate change projections.

The Pacific Ocean has a warm temperature mode and a cool temperature mode, and in the past century, has switched back forth between these two modes every 25-30 years (known as the Pacific Decadal Oscillation or PDO). In 1977 the Pacific abruptly shifted from its cool mode (where it had been since about 1945) into its warm mode, and this initiated global warming from 1977 to 1998. The correlation between the PDO and global climate is well established. The announcement by NASA's Jet Propulsion Laboratory that the Pacific Decadal Oscillation (PDO) had shifted to its cool phase is right on schedule as predicted by past climate and PDO changes (Easterbrook, 2001, 2006, 2007). The PDO typically lasts 25-30 years and assures North America of cool, wetter climates during its cool phases and warmer, drier climates during its warm phases. The establishment of the cool PDO, together with similar cooling of the North Atlantic Oscillation (NAO), virtually assures several decades of global cooling and the end of the past 30-year warm phase.

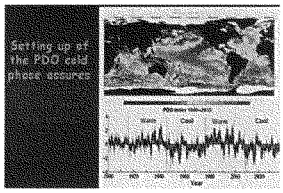


Figure 6. Switch of PDO cool mode to warm mode in 1977 initiated several decades of global warming. The PDO has now switched from its warm mode (where it had been since 1977) into its cool mode. As shown on the graph above, each time this has happened in the past century, global temperature has followed. The upper map shows cool ocean temperatures in blue (note the North American west coast). The lower diagram shows how the PDO has switched back and forth from warm to cool modes in the past century, each time causing global temperature to follow. Projection of the past pattern (right end of graph) assures 30 yrs of global cooling

Comparisons of historic global climate warming and cooling over the past century with PDO and NAO oscillations, glacial fluctuations, and sun spot activity show strong correlations and provide a solid data base for future climate change projections. As shown by the historic pattern of GDOs and PDOs over the past century and by corresponding global warming and cooling, the pattern is part of ongoing warm/cool cycles that last 25-30 years. The global cooling phase from 1880 to 1910, characterized by advance of glaciers worldwide, was followed by a shift to the warm-phase PDO for 30 years, global warming and rapid glacier recession. The cool-phase PDO returned in ~1945 accompanied by global cooling and glacial advance for 30 years. Shift to the warm-phase PDO in 1977 initiated global warming and recession of glaciers that persisted until 1998. Recent establishment of the PDO cool phase appeared right on target and assuming that its effect will be similar to past history, global climates can be expected to cool over the next 25-30 years. The global warming of this century is exactly in phase with the normal climatic pattern of cyclic warming and cooling and we have now switched from a warm phase to a cool phase right at the predicted time (Fig. 5)

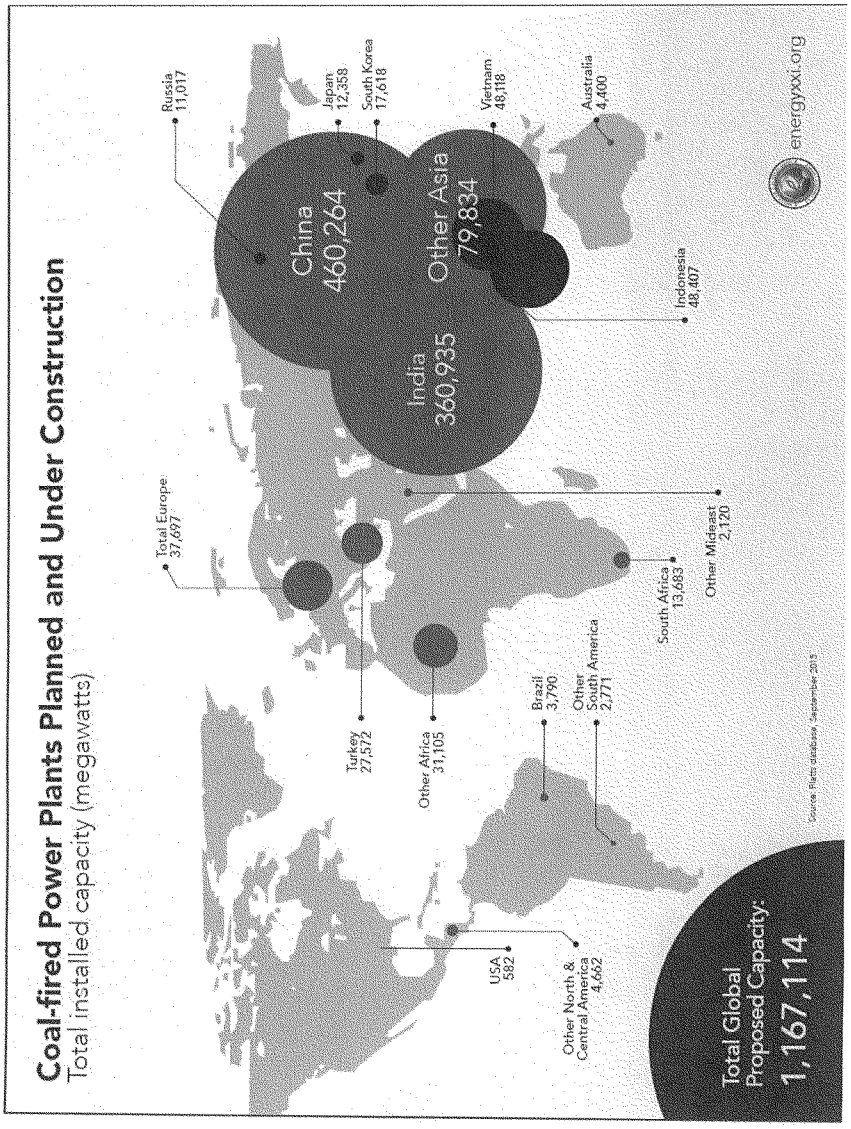
The ramifications of the global cooling cycle for the next 30 years are far reaching—e.g., failure of crops in critical agricultural areas (it's already happening this year), increasing energy demands, transportation difficulties, and habitat change. All this during which global population will increase from six billion to about nine billion. The real danger in spending trillions of dollars trying to reduce atmospheric CO2 is that little will be left to deal with the very real problems engendered by global cooling.

CONCLUSIONS

Global warming (i.e, the warming since 1977) is over. The minute increase of anthropogenic CO2 in the atmosphere (0.008%) was not the cause of the warming—it was a continuation of natural cycles that occurred over the past 500 years.

The PDO cool mode has replaced the warm mode in the Pacific Ocean, virtually assuring us of about 30 years of global cooling, perhaps much deeper than the global cooling from about 1945 to 1977. Just how much cooler the global climate will be during this cool cycle is uncertain. Recent solar changes suggest that it could be fairly severe, perhaps more like the 1880 to 1915 cool cycle than the more moderate 1945-1977 cool cycle. A more drastic cooling, similar to that during the Dalton and Maunder minimums, could plunge the Earth into another Little Ice Age, but only time will tell if that is likely.

Don J. Easterbrook *is Professor Emeritus of Geology at Western Washington University. Bellingham, WA. He has published extensively on issues pertaining to global climate change. For further details see his list of publications*


Coal-fired Power Plants Planned and Under Construction
Total installed capacity (megawatts)
China
460,264
India
360,935
Other Asia
79,834
Total Europe
37,697
Russia
11,017
Japan
12,358
South Korea
17,618
Vietnam
48,118
Australia
4,400
Indonesia
48,407
Other Mideast
2,120
South Africa
13,683
Turkey
27,572
Other Africa
31,105
Brazil
3,790
Other South America
2,771
USA
582
Other North & Central America
4,662
Total Global Proposed Capacity:
1,167,114
energyxxi.org

DOCUMENTS SUBMITTED BY REPRESENTATIVE GARY PALMER

THE DAILY CALLER

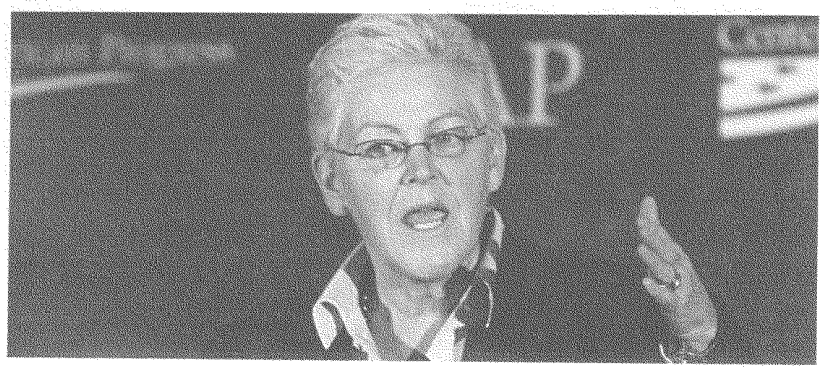
OPINION

The EPA's Clean Power Plan Won't Save The World, But It Will Cause Human Suffering

CHUCK DEVORE

Vice President, Texas Public Policy Foundation

9:26 AM 10/19/2015



Americans are largely ambivalent about global warming. A Gallup poll in March after last winter's epic run found 55 percent of Americans thought that increases in the Earth's temperature were mostly due to human activities while only 37 percent thought that global warming would pose a serious threat to them personally or their way of life.

The Environmental Protection Agency's (EPA) Clean Power Plan (CPP) aims to cut carbon dioxide emissions among America's electrical power industry by 32 percent below 2005 levels by 2030 for a total of 871 million tons per year. To what end? The EPA's own calculations estimate a reduction in the global temperature of eighteen one-thousandths of a degree by 2100.

Revisiting Gallup's poll, had respondents known that concerns over global warming and what to do about it would double, triple, or quadruple their electric bills to achieve an imperceptible temperature reduction, a solid majority might have expressed pessimism about their future living standards.

American's ongoing reluctance to fully embrace the centralization of another industry essential to their daily lives—all in the name of the greater good—is likely due to an instinctively practical outlook. Applying some logical rigor to the issue, three questions must be answered in the affirmative before embarking on a full scale quest to dismantle our reliable and efficient electrical infrastructure: Does human activity contribute significantly to climate change? If so, then: Is the amount of human-caused climate change on balance provably negative (for instance, on the positive side of the leger, more people die from the cold of winter than from heat waves while crops benefit from a longer growing season and more CO2)? If so, then: Can something be done about it with government action or technology that doesn't, on balance, increase human suffering?

The EPA's plan to nationalize the U.S. electric grid assumes that the answers to the first two questions are a "yes" then proposes action that does nothing while substantially increasing human suffering, especially among the working poor.

According to the Electric Reliability Council of Texas (ERCOT) in an October 16 news release, the Clean Power Plan would necessitate the retirement of 4,000 megawatts (MW) of coal-fired power plants in Texas alone beginning as soon as seven years from now with EPA mandates requiring another 2,200 MW of coal power retirements by 2030. Retail electric prices would increase by 16 percent, not including the substantial costs for new transmission lines from remote wind or solar power projects as well as billions for needed redundant backup power systems for when the wind isn't blowing and the sun isn't shining with the reliability of the grid itself put at risk. (Anyone for rolling blackouts on a hot, humid Texas summer day?) Additional costs would pile on as the CPP's emissions targets ratchet down.

Anticipating pushback on the CPP for proposing a lot of pain for no gain, the EPA has taken to claiming that a forced reduction in CO2, a natural atmospheric gas that has no health implications for humans—we breathe out about 2.3 pounds of the stuff every day—will have "co-benefits." In other words, reducing CO2 itself won't do a darn thing to improve human health, but, in the process of de-fossil fueling America, there will be ancillary health benefits—trust us!

Dr. Bryan W. Shaw, Ph.D., P.E., the Chairman of the Texas Commission on Environmental Quality said as much in a letter to Congress on Oct. 16 where he noted that the EPA itself has concluded that, "Greenhouse gases, at both current and projected atmospheric concentrations, are not expected to pose exposure risks on human respiratory systems…" Further, Chairman Shaw noted that EPA chief Gina McCarthy herself testified to Congress that the "CPP will not have any meaningful direct

impact on respiratory health, atmospheric temperatures, or sea level rise." Which begs the question: why are we doing this? To which Administrator McCarthy responds: it can "...actually trigger global action..."

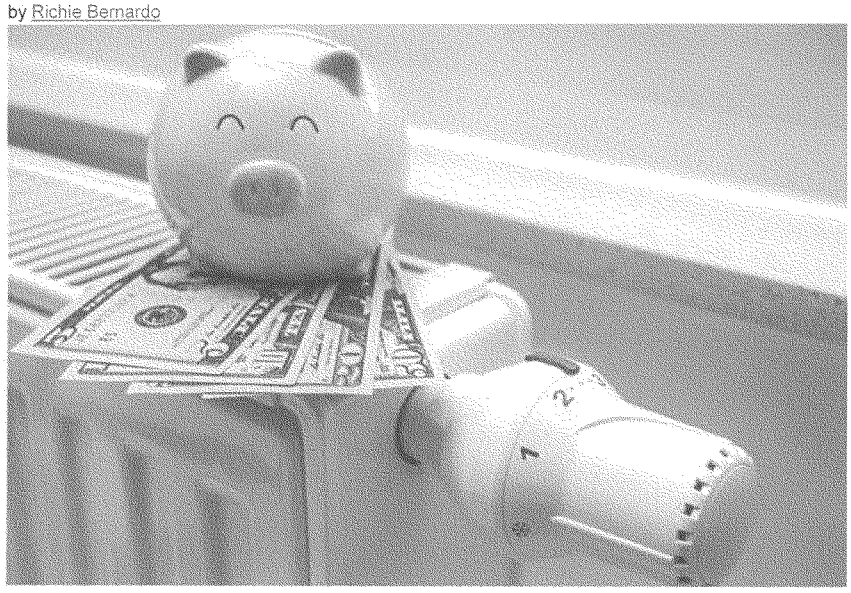
But wait, it gets even better! Even the expected "co-benefits" from a reduction in CO2 aren't, in fact, beneficial. The EPA claims that a reduction in CO2 will reduce PM2.5 particulates which will be a benefit to human health, but, in Texas' case, not a single of its 254 counties are out of compliance for PM2.5 particulates today with the EPA itself concluding that the particulate levels don't need to be reduced. The U.S. Supreme Court took a dim view of claiming "co-benefits" in its Mercury and Air Toxics Standard ruling, with Chief Justice Roberts noting that a claim of "co-benefits" to justify a rule could be "an illegitimate way" for the EPA to avoid legal limitations. (Perish the thought, a government agency grasping for power not its own to wield!)

By the EPA's own admission, the Clean Power Plan is nothing more than a global PR scheme—expect to see it take center stage at the international climate talks in Paris this December. In the meantime, average Americans will see higher electric bills and no benefit for the lower standard of living.

WalletHub

2015's Most & Least Energy-Expensive States

by Richie Bernardo



Get ready to crank up those air conditioners. July tends to be the hottest month of the year, and the heat will likely burn a hole through your wallet. In fact, about 7.3 percent of the average consumer's total annual income goes to energy costs. So if you're planning to relocate this summer, perhaps to start a new job, you may want to consider the disparity in energy costs among the candidate states on your short list.

Keep in mind that lower prices don't always equate with lower costs, as consumption is a key determinant in the total amount of an energy bill. In areas such as Southern Louisiana, with scorching summer weather but cheap electricity, households still end up with higher out-of-pocket costs than those in energy-expensive Northern California, where the temperate climate keeps heating and cooling units idle most of the year.

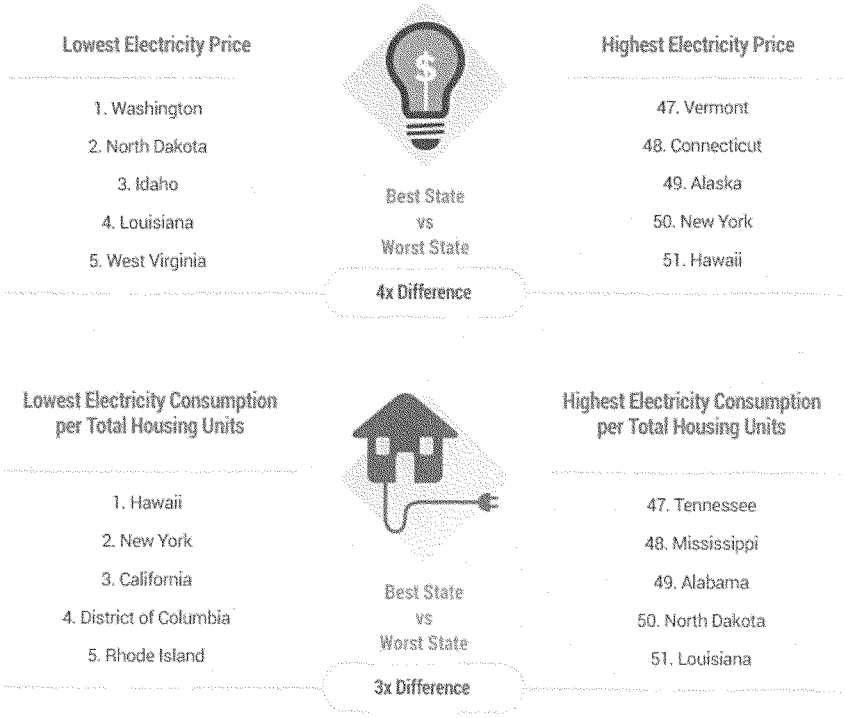
To help consumers budget for certain utilities, WalletHub compared the total monthly energy bills in each of the 50 states and the District of Columbia. We constructed the ranking using eight key metrics that examine the consumption rates and prices of four energy types: electricity, natural gas, motor fuel and home heating oil. Our findings, as well as expert commentary and a detailed methodology, can be found below.

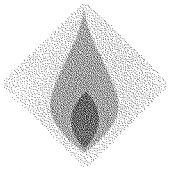
Overall Rank	State	Total Energy Cost	Monthly Electricity Cost (Rank)	Monthly Natural Gas Cost (Rank)	Monthly Motor Fuel Cost (Rank)	Monthly Home Heating Oil Cost (Rank)
1	District of Columbia	$223	$79 (1)	$51 (41)	$84 (1)	$8.76 (37)
2	Colorado	$244	$93 (5)	$44 (38)	$107 (6)	$0.10 (13)
3	Washington	$245	$99 (8)	$30 (21)	$113 (13)	$2.95 (27)
4	Oregon	$261	$105 (11)	$28 (17)	$126 (23)	$3.00 (29)
5	Arizona	$268	$136 (36)	$19 (9)	$113 (11)	$0.01 (4)
6	New Mexico	$274	$87 (3)	$35 (27)	$151 (44)	$0.03 (7)
7	Illinois	$274	$87 (2)	$65 (50)	$122 (17)	$0.25 (16)
8	Florida	$276	$148 (47)	$3 (1)	$124 (21)	$0.02 (6)
9	California	$280	$96 (6)	$32 (22)	$153 (45)	$0.10 (12)
10	Louisiana	$284	$141 (41)	$20 (11)	$123 (19)	$0.02 (5)
11	Iowa	$287	$110 (17)	$44 (37)	$131 (30)	$1.40 (24)
12	Montana	$287	$105 (10)	$35 (26)	$144 (39)	$2.98 (28)
13	Arkansas	$287	$129 (30)	$27 (16)	$131 (31)	$0.05 (9)

Overall Rank	State	Total Energy Cost	Monthly Electricity Cost (Rank)	Monthly Natural Gas Cost (Rank)	Monthly Motor Fuel Cost (Rank)	Monthly Home Heating Oil Cost (Rank)
14	Wisconsin	$289	$109 (16)	$45 (39)	$129 (29)	$4.84 (34)
15	Tennessee	$289	$137 (37)	$23 (12)	$129 (28)	$0.24 (15)
16	South Carolina	$290	$162 (50)	$17 (5)	$111 (9)	$0.62 (21)
17	Idaho	$291	$115 (20)	$32 (23)	$141 (38)	$3.41 (31)
18	Kentucky	$294	$129 (31)	$26 (15)	$138 (36)	$0.86 (22)
19	North Carolina	$294	$138 (38)	$18 (8)	$134 (33)	$3.12 (30)
20	Virginia	$296	$136 (35)	$28 (18)	$122 (16)	$10.51 (39)
21	South Dakota	$296	$126 (28)	$29 (19)	$136 (34)	$4.34 (33)
22	Ohio	$298	$115 (19)	$52 (42)	$128 (26)	$4.02 (32)
23	Kansas	$298	$119 (23)	$52 (43)	$128 (24)	$0.04 (8)
24	Nevada	$301	$121 (25)	$33 (24)	$147 (41)	$0.37 (20)
25	Texas	$302	$148 (46)	$20 (10)	$134 (32)	$0.001 (1)
26	Nebraska	$304	$140 (39)	$40 (31)	$125 (22)	$0.36 (19)
27	Michigan	$304	$108 (15)	$66 (51)	$128 (25)	$2.06 (25)
28	Hawaii	$307	$179 (51)	$5 (3)	$122 (18)	$0.002 (3)
29	Minnesota	$307	$107 (12)	$45 (40)	$149 (42)	$6.34 (36)

Overall Rank	State	Total Energy Cost	Monthly Electricity Cost (Rank)	Monthly Natural Gas Cost (Rank)	Monthly Motor Fuel Cost (Rank)	Monthly Home Heating Oil Cost (Rank)
30	New Jersey	$307	$118 (21)	$65 (49)	$105 (3)	$20.52 (42)
31	Utah	$308	$91 (4)	$56 (45)	$161 (48)	$0.31 (18)
32	West Virginia	$310	$124 (27)	$30 (20)	$151 (43)	$5.12 (35)
33	Delaware	$312	$146 (45)	$34 (25)	$113 (12)	$17.95 (40)
34	Missouri	$318	$140 (40)	$41 (33)	$136 (35)	$0.29 (17)
35	Pennsylvania	$319	$133 (34)	$44 (36)	$105 (4)	$37.70 (43)
36	Maryland	$321	$141 (42)	$38 (29)	$124 (20)	$18.51 (41)
37	New York	$321	$110 (18)	$60 (47)	$112 (10)	$38.65 (44)
38	Indiana	$322	$123 (26)	$41 (32)	$157 (46)	$1.20 (23)
39	Alabama	$323	$160 (49)	$25 (13)	$138 (37)	$0.11 (14)
40	New Hampshire	$324	$120 (24)	$16 (4)	$109 (8)	$79.64 (47)
41	Mississippi	$331	$153 (48)	$17 (6)	$161 (47)	$0.002 (2)
42	Georgia	$331	$145 (44)	$42 (34)	$144 (40)	$0.09 (11)
43	Oklahoma	$334	$130 (32)	$37 (28)	$167 (49)	$0.07 (10)
44	Maine	$341	$101 (9)	$4 (2)	$128 (27)	$107.60 (50)
45	Vermont	$342	$118 (22)	$18 (7)	$119 (15)	$86.62 (48)

Overall Rank	State	Total Energy Cost	Monthly Electricity Cost (Rank)	Monthly Natural Gas Cost (Rank)	Monthly Motor Fuel Cost (Rank)	Monthly Home Heating Oil Cost (Rank)
46	North Dakota	$342	$131 (33)	$26 (14)	$176 (50)	$9.00 (38)
47	Rhode Island	$346	$98 (7)	$54 (44)	$95 (2)	$99.18 (49)
48	Alaska	$349	$127 (29)	$56 (46)	$105 (5)	$61.22 (45)
49	Massachusetts	$352	$108 (14)	$63 (48)	$108 (7)	$73.48 (46)
50	Wyoming	$355	$108 (13)	$42 (35)	$203 (51)	$2.14 (26)
51	Connecticut	$410	$142 (43)	$39 (30)	$118 (14)	$110.55 (51)


Lowest Electricity Price
1. Washington
2. North Dakota
3. Idaho
4. Louisiana
5. West Virginia
Best State
vs
Worst State
4x Difference
Highest Electricity Price
47. Vermont
48. Connecticut
49. Alaska
50. New York
51. Hawaii
Lowest Electricity Consumption per Total Housing Units
1. Hawaii
2. New York
3. California
4. District of Columbia
5. Rhode Island
Best State
vs
Worst State
3x Difference
Highest Electricity Consumption per Total Housing Units
47. Tennessee
48. Mississippi
49. Alabama
50. North Dakota
51. Louisiana



Best State
vs
Worst State

7x Difference

Lowest Natural-Gas Price

1. North Dakota
2. Colorado
3. Idaho
T-4. Minnesota
T-4. Montana

Highest Natural-Gas Price

47. Maine
48. Alabama
49. Vermont
50. Florida
51. Hawaii

Lowest Natural-Gas Consumption per Total Housing Units

1. Hawaii
2. Florida
3. Maine
4. Vermont
5. New Hampshire

Highest Natural-Gas Consumption per Total Housing Units

47. New Jersey
48. Alaska
49. Utah
50. Michigan
51. Illinois

Lowest Fuel Price

1. South Carolina
2. Mississippi
3. Alabama
4. Arkansas
5. Tennessee

Highest Fuel Price

47. Nevada
48. Washington
49. Hawaii
50. California
51. Alaska

Lowest Fuel Consumption per Driver

1. District of Columbia
2. Alaska
3. Rhode Island
4. Washington
5. Hawaii

Best State
vs
Worst State

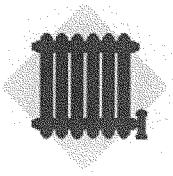
3x Difference

Highest Fuel Consumption per Driver

47. Indiana
48. North Dakota
49. Mississippi
50. Oklahoma
51. Wyoming

Lowest Home Heating-Oil Price

1. Nebraska
2. Iowa
3. Kentucky
4. Minnesota
5. Wisconsin



Highest Home Heating-Oil Price

47. Massachusetts
48. New Jersey
49. Connecticut
50. New York
51. District of Columbia

Lowest Home Heating-Oil Consumption per Total Housing Units

1. Texas
2. Mississippi
3. Hawaii
4. Arizona
5. Louisiana

Highest Home Heating-Oil Consumption per Total Housing Units

47. New Hampshire
48. Vermont
49. Rhode Island
50. Connecticut
51. Maine

Ask the Experts

According to the U.S. Energy Information Administration, the highest energy consumption of the year is recorded in July, followed by August. And energy costs are bound to rise in tandem with climbing temperatures. For insight into the various ways Americans can reduce their dependence on traditional energy sources — and thereby diminish their costs as well — we asked a panel of energy and policy experts to weigh in. Click on the experts' profiles to read their bios and responses to the following key questions:

1. What are some good tips for saving money on energy bills?
2. Are tax deductions and credits effective at incentivizing households to be more energy-efficient?
3. Do you believe the government should continue to provide energy assistance to low-income households? If so, what is the best way to do so?
4. What is the impact of the recent oil price drop on energy efficiency? Is cheap oil inhibiting the transition to renewables?

Methodology

To help consumers budget for costly energy bills, WalletHub compared the 50 states and the District of Columbia across eight key metrics, ranging from the price and consumption of residential electricity to the price and consumption of motor fuel.

The following equation was used to calculate the average monthly energy bill in each state:

(Average Monthly Consumption of Electricity * Average Retail Price of Electricity) + (Average Monthly Consumption of Natural Gas * Average Natural Gas Residential Prices) + (Average Monthly Consumption of Home Heating Oil * Average Home Heating Oil Residential Prices) + (Average Fuel Price * (Miles Traveled/Average Motor-Fuel Consumption/Number of Drivers in the State)) = Average Monthly Energy Bill

Source: Data used to create these rankings were obtained from the U.S. Energy Information Administration, the Federal Highway Administration, the U.S. Environmental Protection Agency (EPA) and AAA's Daily Fuel Gauge Report.

STATEMENT SUBMITTED BY COMMITTEE RANKING MEMBER EDDIE BERNICE JOHNSON

Opening Statement

Ranking Member Eddie Bernice Johnson
Committee on Science, Space, and Technology

"The Administration's Empty Promises for the International Climate Treaty"

November 18, 2015

Thank you, Mr. Chairman, and thank you to our witnesses for being here this morning to discuss EPA's Clean Power Plan and next month's UN climate negotiations. The scientific evidence shows us that we cannot afford to wait, but must act now if we are to stand a chance of lessening the impacts of climate change.

Unfortunately, we've crossed a number of significant thresholds in recent months. For example, the World Meteorological Organization reported that the Earth's average level of carbon dioxide exceeded 400 parts per million in 2015, a level that has not been observed for millions of years.

And as many of you know, the IPCC has recommended that we keep our global temperature rise below 2 degrees Celsius in order to avoid the most severe impacts of climate change. Regrettably, we are halfway to that critical threshold as a recent report by Britain's Met Office found the average temperature of the Earth is now more than a degree above the historic norm.

As the largest source of carbon pollution, cutting emissions from power plants is the key to any solution. This is why I am supportive of the EPA's Clean Power Plan and its goal of reducing carbon emissions from the power sector by 32 percent by 2030.

The final rule we will be discussing today sets reasonable limits that take into account the characteristics of each state. States get to choose what goes into their plans, and they can work alone or as part of a multi-state effort to achieve meaningful carbon reductions. The central feature of the rule is the enormous flexibility it provides to states.

However, we will likely hear again today that the Clean Power Plan will cause nothing but harm to our economy; that the federal government is overstepping its authority; and that the rule won't make any difference in the long-run.

We will also hear that the President's climate agenda is "extreme" and that it is being driven by "climate alarmists." Thankfully, a poll by the Pew Research Center highlights

the fact that if we look beyond partisan politics there has been a change in attitude and a clear recognition of the need for action on climate change. Specifically, a majority of respondents in all but one of the 40 countries surveyed support placing limits on greenhouse gas emissions. That includes 69 percent of respondents in the United States, 71 percent in China, 70 percent in India, and 65 percent in Russia.

I recognize that implementing the Clean Power Plan will not be easy, and that there are real costs associated with transitioning to a low carbon economy. But the bottom line is that the costs of inaction are even greater.

Equally important is that in addition to its long-term benefits, the Clean Power Plan sends a strong and much needed signal to the rest of the world about the seriousness of the United States in addressing climate change. Such a commitment is critical to meaningful international engagement.

I look forward to today's discussion and to learning more about how we can achieve the carbon reductions called for in the Clean Power Plan.

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

STATEMENT SUBMITTED BY REPRESENTATIVE ELIZABETH H. ESTY

ELIZABETH H. ESTY

Statement and Questions for the Record
Hearing of the House Committee on Science, Space, and Technology
"The Administration's Empty Promises for the International Climate Treaty"

November 18, 2015

Thank you, Chairmen Smith for holding today's hearing on the Environmental Protection Agency's (EPA) final Clean Power Plan (CPP) rule.

Connecticut's successes with greenhouse gas emission reductions have been vast. We have already surpassed our 2020 goal of reducing emissions below 1990 levels and currently remain on a trajectory that will yield an 80% reduction of emissions below 2001 levels by 2050.

Connecticut's path forward is an extraordinary one, but we also know that no single country or state can possibly address climate change alone. Part of Connecticut's success with carbon pollution reduction can be traced to its participation in the Regional Greenhouse Gas Initiative (or RGGI, pronounced "Reggie")—a mass-based, multi-state approach to reducing carbon pollution in the electric sector.

Empowering residents and businesses to use energy more efficiently is one several multi-faceted approaches in RGGI. In fact, according to a report that tracks investments made by RGGI states from 2008 to 2013, *Investment of RGGI Proceeds Through 2013*, cumulative investments in energy efficiency programs are vastly greater than investments to any other programs, including clean and renewable energy, direct bill assistance, and greenhouse gas abatement.

Deputy Commissioner Dykes, in your testimony you highlight the success stemming from Connecticut's participation in RGGI as well as complementary state policies and programs, like the Connecticut Energy Efficiency Fund (CEEF).

- Can you speak more to Connecticut's state policies regarding energy efficiency? Specifically, can you discuss how the Energize Connecticut Initiative –funded through the CEEF – has benefited Connecticut towns and cities, such as my hometown of Cheshire, and Waterbury, "the brass city," located in my congressional district?
- Can you explain how leading industries in our state, like Connecticut Light and Power Company and the United Illuminating Company have worked with residents and businesses to improve their energy efficiency standards?
- How has the Home Energy Solutions program (HES), through the CEEF, incentivized Connecticut's residents and businesses to adopt energy-efficient measures and behaviors?
- Can you speak to the economic impact of the steps Connecticut has taken to reduce energy usage/improve efficiency and to develop technologies and create jobs in the state?
- Are there any lessons other states can learn from the Regional Greenhouse Gas Initiative? Or from Connecticut's state policies and programs?

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