

BENEFITS OF AND CHALLENGES TO ENERGY ACCESS IN THE 21ST CENTURY: ELECTRICITY

HEARING BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER OF THE COMMITTEE ON ENERGY AND COMMERCE HOUSE OF REPRESENTATIVES ONE HUNDRED THIRTEENTH CONGRESS SECOND SESSION

—
FEBRUARY 27, 2014
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Serial No. 113–121



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

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U.S. GOVERNMENT PRINTING OFFICE

88–797 PDF

WASHINGTON : 2014

For sale by the Superintendent of Documents, U.S. Government Printing Office
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¹ Internet link to the report "2013 Carbon Dioxide Price Forecast" is on page 77.

² Internet link to the report is on page 124.

BENEFITS OF AND CHALLENGES TO ENERGY ACCESS IN THE 21ST CENTURY: ELECTRICITY

THURSDAY, FEBRUARY 27, 2014

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

The subcommittee met, pursuant to call, at 10:16 a.m., in room 2123 of the Rayburn House Office Building, Hon. Ed Whitfield (chairman of the subcommittee) presiding.

Members present: Representatives Whitfield, Shimkus, Terry, Latta, Olson, McKinley, Pompeo, Kinzinger, Griffith, Barton, McNerney, Tonko, Green, Barrow, Matsui, Christensen, Castor, and Waxman (ex officio).

Staff present: Nick Abraham, Legislative Clerk; Charlotte Baker, Press Secretary; Sean Bonyun, Communications Director; Allison Busbee, Policy Coordinator, Energy and Power; Tom Hassenboehler, Chief Counsel, Energy and Power; Brandon Moonney, Professional Staff Member; Mary Neumayr, Senior Energy Counsel; Peter Spencer, Professional Staff Member, Oversight; Caitlin Haberman, Democratic Policy Analyst; Bruce Ho, Democratic Counsel; Alexandra Teitz, Democratic Senior Counsel, Environment and Energy; and Kate Istoll, Democratic Fellow.

OPENING STATEMENT OF HON. ED WHITFIELD, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF KENTUCKY

Mr. WHITFIELD. I would like to call the hearing to order this morning and certainly want to thank the witnesses for being with us today.

This morning, we do begin a new hearing series entitled “Benefits of and Challenges to Energy Access in the 21st Century.” And today’s hearing will focus on electricity access, and the next hearing will deal with fuel supply and infrastructure issues.

Now, when we talk about access to electricity, in America we are fortunate that we have a well-developed system, but many of us are genuinely concerned that the Obama administration is pushing us so quickly, so fast into a renewable mode, and the President says that he supports an all-of-the-above energy policy, which all of us do support. But his actions indicate that certainly on coal he does not see that coal really has a future in America, despite what he might say.

And most people recognize, I think, that Europe at least has the reputation of being the green sector of the world, and 22 percent

of their electricity comes from renewables. But we also know that they are having great difficulty. They have an unemployment rate of 12 percent, gas prices are so high that they mothballed 30 gigawatts of natural gas-powered plants to produce electricity, and last year, they imported into their area about 50 percent of our coal export market. And they are using more coal because natural gas prices are too high.

And I think realistically in America we don't think anyone is going to build a new coal-powered power plant with natural gas prices as low as they are, but most of us genuinely believe that we should have the option to build a coal-powered plant in the future. And with the greenhouse gas regulations that will become final supposedly this summer, it will be impossible to build a new coal-powered plants because the technology is not available to meet the emissions standards set by EPA. And we feel very strongly and have written letters to EPA asking for an explanation, that their emissions standard was set illegally because the plants that they rely on is an explicit violation of the 2005 Energy Policy Act.

And I think that this recent cold spell should also cause concern for all of us. The CEO of AEP announced that 89 percent of their plants in operation to meet this cold spell demand are scheduled to be retired in 2015. Southern Company, 75 percent of their coal plants, operating at capacity for this recent cold spell, plan to be retired. Luminant brought two coal-fired plants back into operation in Texas for this cold spell. TVA set an electricity demand record during this cold spell and they are planning to close 20 coal-fired plants. The nuclear companies have written us letters saying that the pending cooling tower regulation coming out of EPA threatens the premature shutdown of a significant number of nuclear power plants.

So, on the one hand, you talk to people and they say, well, climate change is the number one issue and that has got to be addressed. On the other hand, if people's reliability is threatened and if we can't compete in a global marketplace because we are eliminating one source of fuel that we might be able to use in the future, then we are threatening jobs and the economy.

But one of the most disturbing things from my perspective is that the Obama administration is being so aggressive in making sure that the World Bank and even they attempted—the Ex-Im Bank and the Asian Development Bank and other financial institutions will not provide funding for a coal plant to be built anywhere in the world. We have people from Bangladesh coming to talk to us, people from Africa. I was reading in Nigeria half the people there don't even have electricity.

So this administration, not only are their regulations affecting us domestically, but they are affirmatively, aggressively trying to prevent the building of a new coal-powered plant even with the best technology anywhere in the world even though in those areas what they are burning now is fuel oil using generators that is much dirtier than emissions from a supercritical coal plant, for example.

So these are issues that we are struggling with and they have got to be answered. We can't just run off, as John Kerry said recently in Indonesia, that climate change is the mass destruction

weapon facing mankind. I think that kind of extreme view is not good or healthy.

My time is expired, and I was just getting started.
[The prepared statement of Mr. Whitfield follows:]

PREPARED STATEMENT OF HON. ED WHITFIELD

Today's hearing will focus on electricity access, and the next hearing will deal with fuel supply and infrastructure issues. The unusually cold weather we have recently experienced across the Nation underscores the importance of affordable and reliable electricity.

Nonetheless, under the Obama administration electricity access is being jeopardized by a number of already finalized or pending measures raising its cost. This includes pending global warming-related regulations from the Environmental Protection Agency.

Regardless of intention, I believe any policy that increases the price of energy runs a serious risk of doing more harm than good. And the first victims of misguided measures are the least fortunate in society, both here in the U.S. and around the world.

EPA's rules threaten electric reliability as well as affordability. EPA's rules are contributing to an unprecedented number of coal plant shutdowns that will occur in the next few years as environmental regulations take effect. Taking coal out of the equation means that America's most abundant source of baseload electricity will have a diminishing role. The North American Electric Reliability Corporation's most recent Long-Term Reliability Assessment and other studies have raised serious concerns about electric reliability in the near future. Among the EPA rules contributing to reliability problems are the Mercury and Air Toxics, or "Utility MACT," rule, that is accelerating the pace of coal-fired power plant retirements, and the proposed greenhouse gas New Source Performance Standards for power plants that would effectively ban any new coal from coming online. To address the latter, we need to enact H.R. 3826, the Electricity Security and Affordability Act, in order to keep new coal in our energy future.

America's growing natural gas abundance is clearly a blessing, but the recent cold spells demonstrate that there are limits to the ability of natural gas to replace coal. In fact, it was necessary to increase the use of coal-fired generation to get us through the periods of high demand brought on by the very cold temperatures. This included many coal facilities scheduled to shut down in the next 2 years. We should look at this winter as an early warning that reliability is at risk.

Now I might add that it is not even necessary to be a global warming skeptic to be a skeptic of these policies. Even EPA administrator Gina McCarthy admitted to this committee that none of her agency's costly global warming rules would make a measurable difference. In other words, the Obama energy agenda is all economic pain for no environmental gain.

And the pain will fall disproportionately on the poor, who are least able to handle higher electric bills. The unemployed are also hurt, as higher electricity costs slow the pace of job creation, and the war on coal is eliminating job opportunities in many communities.

The damage around the world from the administration's climate policies could be even worse. 1.2 billion people still don't have access to electricity. The last thing they need imposed on them is a costly climate agenda that puts the dream of electrification even further out of reach.

For this reason, I am particularly disappointed by the administration's opposition to financing for new state-of-the-art new coal-fired power plants in developing countries, and I'm perplexed by the President's insistence that he supports the goal of increased electricity access while also pursuing an uncompromising global warming agenda that effectively deprives people of such access.

Unfortunately, those seeking to advance a global warming agenda lose sight of the things that really matter. Today, we will refocus on what really matters—ensuring affordable and reliable energy for as many people as possible.

Mr. WHITFIELD. At this time, I recognize the gentleman from California, Mr. McNerney, for an opening statement.

OPENING STATEMENT OF HON. JERRY MCNERNEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. MCNERNEY. Well, I thank the chairman. I want to thank the witnesses for coming out here today despite the weather and whatever other obstacles you may have had. I just want to say a little rebuttal to the chairman, who I have a great respect for.

Coal does have a future in this country but we need to implement carbon capture and sequestration technology and develop that technology, which would be a benefit to the coal industry. That being said, electricity and energy production and our environment are interconnected and it is essential that we continue efforts to produce energy in a responsible way. We know, as has been confirmed by the world's leading scientists, that climate change is happening and that human activities, including burning fossil fuels, are driving this change.

We have also seen that climate change threatens our electricity system itself and our economy through impacts like droughts like the one we are now having in California, where water accounts for about 15 percent of our total power supply. This drought has disrupted hydroelectric dams and forced utility companies to purchase electricity from other sources that is up to three times more expensive than hydro.

Severe weather events, disasters, polar vortices, and large wildfires also pose additional strains to our electricity system. As a result, when considering electricity access in the coming years, we must consider climate change. Energy efficiency demand response, grid resiliency, reliability measures and modernization could all help to mitigate and prepare for the climate impacts that scientists tell us are coming. Addressing electric enhancements and vulnerabilities that providers are more capable of preparing for and responding to our energy needs during extreme weather events and also boost our economy by creating manufacturing jobs and encouraging innovation.

Our Nation generates electricity from a variety of sources; 39 percent comes from coal, 29 percent from natural gas, 19 percent from nuclear, and 13 percent from renewable sources. Renewable energy capacity alone has surpassed 90 gigawatts and is becoming more competitive with fossil fuels every year. In this committee, we have talked about American efforts to curb carbon pollution and greenhouse gas emissions and how that parallels the energy policies of other nations.

The U.S. should lead by example. We can show other countries that we are more environmentally responsible to meet our energy needs. Coal will remain a component of our Nation's energy infrastructure but we can show that there are ways to make it cleaner. For example, there will be plants online this year both in the United States and Canada where CCS technology will significantly reduce coal's carbon pollution. We are also seeing the potential benefits of microgrids where consumers may be better able to handle energy needs. When wildfires take down a power line, the microgrid system can provide additional power back to the utility.

The International Energy Agency estimates that by 2020, developing countries will double their electricity power output. There

will be regions where new centralized power plants make sense economically and that it is appropriate for existing infrastructure. However, microgrids could and should be essential to bringing power to many developing regions. That is because connecting a remote community to a conventional power grid with its large, centralized power plants is expensive and could take more than a decade.

Building and combining power from multiple local sources can be cheaper, more secure, and faster than extending the grid to remote areas. This type of distributed generation also typically relies less on carbon-intensive energy sources.

With that, I look forward to hearing the witnesses' testimony and I yield back.

Mr. WHITFIELD. Thank you very much, Mr. McNerney.

And at this time, Mr. Upton was going to make a 5-minute opening statement and we will submit it for the record, but he is not here today.

So is there anyone on our side of the aisle that would like to make a statement?

I know that Members of Congress always like to speak. I saw Mr. Waxman coming in so I was trying to stress that someone talk on our side, but at this time I recognize Mr. Waxman for 5 minutes.

OPENING STATEMENT OF HON. HENRY A. WAXMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. WAXMAN. Thank you very much, Mr. Chairman, on behalf of the opening statement-makers.

I want to say we are having a hearing on electricity access. Access to affordable, reliable electricity is fundamental to our economy. It is a subject we should be working together to address, especially since much of our current electricity infrastructure is decades old and will need to be replaced or upgraded in the coming years.

According to the Edison Foundation, these investments will cost over \$1 trillion over the next two decades. But we can't have an honest discussion about the future of the electricity system unless we talk about climate change. Until we have an energy policy that acknowledges the reality of climate change, the utility industry will operate in a perpetual state of uncertainty.

Outside of Congress, there is a broad agreement that climate change is the most significant issue facing our energy system and infrastructure needs. On Monday, the CEO of the Nation's largest railroad, Matthew Rose, called for an energy policy that recognizes the reality of climate change. On Tuesday, David Crane, the CEO of the Nation's second-largest power generator, said that climate change is the most serious threat to the future of the world.

These CEOs operate in the real world, so unlike this committee, they know the value of listening to scientists. And scientists know that climate change is occurring in that human activities such as burning fossil fuels are largely responsible. The most recent report from the Intergovernmental Panel on Climate Change, which assessed nearly 10,000 peer-reviewed studies, concludes that "warm-

ing in the climate system is unequivocal,” and “human influence on the climate system is clear.”

And yes, yesterday, the Royal Society in the United Kingdom and our own National Academy of Sciences jointly briefed this committee to reiterate that it is now more certain than ever that humans are changing Earth’s climate and that these changes will have serious impacts on humans, society, and the natural world.

Energy, economic disparity, and the climate are intertwined. The rest of the world knows this. UN Secretary General Ban Ki-Moon calls climate change an existential threat. And World Bank President Jim Yong Kim said that unless we address the climate change, “we could witness the rolling back of decades of development gains and force tens of millions more to live in poverty.” And President Kim said point-blankly, “if we don’t confront climate change, we won’t end poverty.” We need to face this reality if we are going to design an energy policy that protects our environment, grows our economy, and gives companies the certainty they need.

Electricity system investments cost hundreds of millions and often billions of dollars and are expected to last for decades. It makes no sense to build this infrastructure without considering its effects on the climate and the effect of climate change on our energy systems. Much of American industry knows this. Even ExxonMobil screens investments using a price on carbon of \$60 per ton. Most other major oil companies assume carbon prices as well. Wal-Mart, Wells Fargo, Delta, GE, Google, DuPont all are using a price on carbon to guide their decisions.

As we will hear from one of our witnesses today, Synapse, even utility companies are assuming carbon prices in their planning. According to a recent survey, “carbon pricing has been standard operating practice in business planning.” But it is still an anathema even to discuss the idea in this committee. We need to stop denying science and start listening to the scientists and enlightened business leaders if we are going to succeed in crafting a sustainable energy policy for the future.

For the information of our witnesses and our guests at this hearing today, despite repeated requests to have a hearing with scientists, we haven’t even gotten a response to that request, let alone a hearing, so we have a woeful ignorance in this committee of the reality of what is happening in the world today as we look at energy policy.

Thank you, Mr. Chairman. I yield back my time.

Mr. WHITFIELD. Thank you, Mr. Waxman.

And that concludes our opening statements, and so once again, I want to welcome the witnesses and thank you for being with us today. We have a distinguished group of panelists that will provide great insights into this issue that we are talking about, energy access and the benefits and challenges of that.

Our first witness this morning—and I will introduce all of you and then we will go back—but we are delighted to have Mr. Edward Finley, who is the chairman of the North Carolina Utilities Commission. Mr. Finley, thank you for being with us. We have Mr. Bruce Biewald, who is the Chief Executive Officer of Synapse Energy Economics. We have Mr. Mel Coleman, who is the chief executive officer of the Northern Arkansas Electric Cooperative. We have

Mr. Paul O'Brien, who is the Vice President for Policy and Campaigns at Oxfam America. And then we have Dr. Todd Moss, who is the chief operating officer and senior fellow at the Center for Global Development.

So thank all of you for being with us, and each of you will be given 5 minutes for an opening statement and then we will open it up for questions.

So, Mr. Finley, you are recognized for 5 minutes.

STATEMENTS OF EDWARD S. FINLEY, JR., CHAIRMAN, NORTH CAROLINA UTILITIES COMMISSION; BRUCE E. BIEWALD, CHIEF EXECUTIVE OFFICER, SYNAPSE ENERGY ECONOMICS; MEL COLEMAN, CHIEF EXECUTIVE OFFICER, NORTHERN ARKANSAS ELECTRIC COOPERATIVE; PAUL O'BRIEN, VICE PRESIDENT FOR POLICY AND CAMPAIGNS, OXFAM AMERICA; AND TODD J. MOSS, CHIEF OPERATING OFFICER AND SENIOR FELLOW, CENTER FOR GLOBAL DEVELOPMENT

STATEMENT OF EDWARD S. FINLEY, JR.

Mr. FINLEY. Thank you, Chairman. Chairman Whitfield and Ranking Member McNerney and members of the subcommittee, thank you for the opportunity to share with you my thoughts on the important of affordable and reliable electricity in North Carolina.

By far the most difficult aspect of my job is to conduct public hearings at which consumers appear and implore us commissioners to reject utility requests to raise rates. The testimony is often poignant and heartrending. If you approve this request, I will be unable to pay both the power bill and to pay for medicine that I need. We listen to testimony for hours at a time in hearings from one end of our State to the other. In the end, we nevertheless grant at least a percentage of the requested increases because the utilities must maintain their financial health to provide reasonably priced electricity over the long-term and maintain reliable and safe service.

Electric utility rate increases in recent years have been driven primarily by plant construction expenses, a new supercritical coal plant to replace older, less efficient ones, new gas plants constructed for the same reason. More stringent environmental regulations have been a major catalyst.

Our State, its legislature, the electric and gas utilities, and its regulators have acted responsibly in efforts to improve the environment while minimizing financial hardship on the State's citizens that have been hit hard by the recession. Since 2002, we have spent billions on environmental control facilities, coal-to-gas conversion, incentives for renewables, demand response, and energy efficiency measures.

By 2015, our electric utilities will have retired all of their uncontrolled coal plants. However, rules requiring removal of carbon from the remaining smokestacks will prove a challenge for us. We have no place for the repositories.

In 2007, the legislature enacted the first renewable energy portfolio standard in the southeast. It calls for 12.5 percent of electric sales to be from renewables and energy efficiency by 2021. For

Duke Energy, demand-side management and energy efficiency is projected to meet one-third of the projected demand growth over the next 15 years, and for Progress Energy, 20 percent.

We have followed an all-of-the-above policy thinking that is best. We have been able to balance the requirements to keep energy prices affordable while anticipating assisting to formulate and to comply with the rules to protect and improve the environment. We believe this approach is best. It is usually done in an adversarial context where we hear strong arguments from both sides. That seems to be how our energy policy is addressed these days.

Thank you very much.

[The prepared statement of Mr. Finley follows:]

**Summary of Testimony of Chairman Edward S. Finley
North Carolina Utilities Commission
Before the Committee on Energy and Commerce
Subcommittee on Energy and Power
United States House of Representatives**

Benefits of and Challenges to Energy Access in the 21st Century: Electricity

February 27, 2014

Chairman Whitfield, Ranking Member Rush and members of the Subcommittee, the following is a one page summary of my testimony, along with my complete pre-filed testimony.

North Carolina's energy future is one that supports an "all of the above" strategy which attempts to balance expenditures for environmental protection with affordable, reliable electric service. North Carolina has suffered, like many states, during the economic downturn beginning in 2008 and recovery has been slow. During this period of recovery, North Carolina has experienced a changing fuel mix for its electric supply. This change is in part due to abundance of natural gas, but also due in large measure to federal environmental policies. North Carolina is concerned about the cost of compliance with the new suite of proposed environmental regulations in the areas of air, water and waste, which will affect North Carolina's public utilities in providing reliable and affordable electricity for our citizens.

For more than a decade, North Carolina has been working toward the important goals of environmental regulation with the passage of the Clean Smokestacks Act in 2002 and the passage of the North Carolina Renewable Energy and Efficiency Portfolio Standard in 2007. As a result of these actions, as well as many others, North Carolina's generation fleet has already been updated to meet the increasing environmental standards. Further, the State has seen increases in alternative sources of energy in the form of demand-side management, energy efficiency and renewable energy. These efforts by North Carolina have come at a significant cost. For example, North Carolina's ratepayers have invested over \$2.5 billion in state of the art emissions controls for sulfur dioxide (SO₂) and oxides of nitrogen (NO_x).

North Carolina has appropriately balanced these environmental goals and its associated benefits with the costs to the consumers and the economy of North Carolina through the five general rate cases that have been decided since 2009. Adding potential unwarranted additional costs on our ratepayers will threaten reliability and the health, safety and welfare of our citizens. North Carolina is hopeful that future federal environmental regulations will take North Carolina's past actions into account when determining compliance with the evolving standards.

**Written Testimony of Chairman Edward S. Finley, Jr.
North Carolina Utilities Commission**

**Before the
Committee on Energy and Commerce
Subcommittee on Energy and Power
United States House of Representatives**

**Hearing on
Benefits of and Challenges to Energy Access in the 21st Century: Electricity**

February 27, 2014

Chairman Whitfield, Ranking Member Rush, and members of the Subcommittee, thank you for the opportunity to share with you my thoughts on the importance of affordable and reliable electricity for North Carolina.

My name is Edward Finley and I have served on and as Chairman of the North Carolina Utilities Commission since 2007. In fulfilling its important regulatory responsibilities the Commission has attempted to anticipate and allow recovery of costs incurred by electric utilities in the State for environmental regulatory compliance while maintaining a diversity among supply and demand side options and while endeavoring to maintain electric rates as low as reasonably possible. North Carolina has three, major, regulated investor-owned electric utility companies (IOUs): Duke Energy Progress, Inc. (DEP), Duke Energy Carolinas, LLC (DEC) and Virginia Electric and Power Company d/b/a Dominion North Carolina Power (Dominion). These IOUs are vertically integrated and

are not subject to retail competition. With the exception of Dominion, with only 170,000 customers in northeastern North Carolina, the IOUs are not participants in an RTO or ISO, and rates are established and service quality assured through comprehensive rate base/rate of return regulation. DEP and DEC together supply approximately 96% of the utility-generated energy consumed in the state. About 18% of the IOUs' North Carolina electric sales are made into the wholesale market, consisting primarily of electric membership corporations and municipally-owned electric systems. The cooperative and municipal systems own limited electric production facilities.

The IRP Process

The North Carolina Utilities Commission analyzes the probable growth in the use of electricity and the long-range need for future generating capacity in the State.¹ Each regulated utility files information for the Commission to consider as part of this rigorous Least Cost Integrated Resources Planning process (IRP process). This IRP process is an overall planning strategy that integrates demand-side and supply-side resource planning into one comprehensive procedure that weighs the costs and benefits of all reasonably available options in order to identify those options that are most cost effective for ratepayers consistent with the obligation to meet anticipated future demand and to provide adequate, reliable service. In recent years these IRP proceedings have included intervention and participation by environmental intervenors, in addition to the IOUs and consumer advocates, who have advocated greater reliance on renewables, demand response and energy efficiency.

¹ G.S. 62-110.1(c).

North Carolina Demographics

According to the Energy Information Administration (EIA), North Carolina currently has a population of 9.8 million and a civilian labor force of 4.7 million, ranking tenth in the nation for both. However, North Carolina ranks 39th in per capita personal income, with residents making per capita only \$37,049 per year. North Carolina has experienced substantial declines in recent decades in the furniture and tobacco industries, and financial hardship in the many rural areas of the state is pervasive. Fortunately, the current unemployment rate in North Carolina has dropped to 6.9%. However, economic recovery is fragile, and throughout most of 2013, the unemployment rate was higher. For example, in July 2013, North Carolina's unemployment rate was 8.9%, the third highest unemployment rate in the nation.² The economic recovery has been uneven, with large rural areas still experiencing substantial financial hardship. The percentage of North Carolinians living below the poverty level in the DEC and DEP service area is 16%.³ The percentage of customers living below poverty level in the area served by Dominion is 18.19%, and the 2012 percentage for the 26 North Carolina cooperatives is 18.6%.

These statistics are significant when considering the impact of electricity costs driven by federal environmental regulation on North Carolina's economy, public health, and standard of living. See Exhibit Number 1 for additional demographic statistics.

² Bureau of Labor Statistics (Dec. 2013).

³ U.S. Census Bureau (2007-2011 American Community Survey)

As an economic regulator, the Commission's primary concern with meeting the more stringent federal and state environmental requirements is to balance the important need for compliance with the cost of compliance and its impact on rates. North Carolina competes actively in business and industrial recruitment. One of the first questions potential business prospects ask is the price, reliability and safety of electric service in the State. North Carolina's electric rates compare favorably with those in the Southeast and throughout the nation even though it has made substantial progress in reducing harmful environment emissions.

Balancing Costs of Environmental Regulations and Consumers' Ability to Pay

Since December of 2009, after a long period without general rate case activity, North Carolina's ratepayers have experienced five general rate cases, three filed by DEC and one each from DEP and Dominion. These requests have been driven largely by the recent construction of power plants, required in large measure by a need to comply with more stringent environmental regulations. The Commission received testimony and correspondence from hundreds of consumers in these cases resisting the requests due to the difficulty in paying higher electric rates while the effects of the economic recession has strained budgets. See examples of such testimony attached as Exhibit Number 2.

In addition, the Commission received public testimony asking the Commission to disallow requests for rate increases driven by the addition of fossil fuel generating

plants. In the most recent three of the DEC and DEP cases the Commission has required the investor-owned utility to provide for low-income and job development relief ranging from \$10 million to \$20 million.

Even with this low-income assistance, the North Carolina Attorney General and other intervenors, acting on behalf of North Carolina ratepayers, have argued that the resulting rates were still too high for many North Carolinians. The North Carolina Attorney General has appealed four recent rate decisions, all of which are currently pending in the North Carolina Supreme Court. In addition, in 2012 the Commission approved a combination of Duke Energy and Progress Energy at the parent company level and imposed as a condition that the combined company provide \$20 million in low-income and job development assistance. The Commission also imposed a condition of imposing a requirement of approximately \$480 million in North Carolina fuel costs savings for ratepayers.

North Carolina's Changing Fuel Mix

The U.S. energy landscape and the fuel mix for producing electricity has been in a state of flux over the past five years, and North Carolina is no exception. The primary trend has been the replacement of coal-fired generation with natural gas. Natural gas-fired generation produces approximately 50% of the GHG of coal-fired generation. In 2007, for DEP, DEC and Dominion, coal was responsible for 49%, 51% and 35% of electricity

production⁴ respectively, nuclear generation was responsible for 39%, 45% and 29%, and oil and natural gas was responsible for 5%, 1% and 8%. In 2012, for DEP, DEC and Dominion, coal was responsible for 34%, 33% and 21% of electricity production respectively, nuclear generation was responsible for 38%, 49% and 33%, and oil and natural gas was responsible for 18%, 6% and 18%. See also DEC's 2010 Capacity and Energy Mix attached as Exhibits 3 & 4. North Carolina's IOUs, with the Commission's oversight through the IRP and CPCN processes, have properly maintained diversity within the utilities' fuel mix, stating that such diversity allows for affordable and reliable electricity. However, even with the growing dependence on natural gas, in 2012 approximately one-third of the energy sold in NC was produced by coal plants and an even greater percentage came from nuclear units.⁵ EIA states that North Carolina ranked fifth in the nation in net electricity generation from nuclear power in 2011. These nuclear units are some of the most reliable in the nation, and, of course, produce no GHG in the generation process. North Carolina's plants most directly affected by federal environmental policy, coal plants and nuclear plants without cooling towers, are currently providing approximately 70% to 80% of the energy sold, making North Carolinians susceptible to high rate increases for environmental compliance. See Exhibit 6.

⁴ These numbers represent the energy produced as opposed to the amount of installed capacity.

⁵ DEC is incurring development costs toward obtaining a combined construction and operating license from the NRC for additional units at its Lee Power Station in South Carolina. Dominion is too for its North Anna Nuclear station in Virginia.

**North Carolina's Environmental Legislation
And NCUC Orders Improving Emissions Quality**

Over the past decade, North Carolina has taken significant actions to respond to federal environmental policy. These actions have been outlined in Appendix A of a joint letter⁶ dated December 19, 2013, to Ms. Janet McCabe of the United States Environmental Protection Agency (EPA), which is attached hereto as Exhibit 6, regarding the implementation of Section 111(d) of the Clean Air Act. I will not repeat them verbatim in my testimony. However, I will summarize actions taken by the state that have already resulted in a substantial improvement in the state's air quality and a substantial investment by its ratepayers to date and for years to come.

First, in 2002, in anticipation of federal environmental requirements, the North Carolina General Assembly enacted The Clean Smokestacks Act (CSA),⁷ which called for significant reductions of sulfur dioxide (SO₂) and oxides of nitrogen (NO_x) emissions from coal-fired facilities in the state and also resulted in significant reductions in mercury emissions. See Exhibits 7 & 8. These improvements were made at a time when utility earnings were such that the improvements could be financed from revenue headroom without raising short-term rates. As a result of CSA compliance and other environmental control measures, rate paying customers in North Carolina have invested over \$2.5 billion in state of the art emissions controls for NO_x and SO₂ at the seven largest coal-

⁶ The joint signatories were the NC Department of Environment and Resources, the North Carolina Utilities Commission and the North Carolina Utilities Commission – Public Staff.

⁷ Session Law 2002-4.

fired facilities in the state over the last decade, and continue to pay tens of millions of dollars in annual expenses to operate and maintain these emissions control systems.

Second, in March 2007, the Utilities Commission granted DEC a certificate of public convenience and necessity to construct an 800 MW supercritical pulverized coal-fired generating facility (Cliffside 6) as part of its Cliffside Modernization Project. Since it began commercial operation in December 2012, Cliffside 6 has demonstrated that it is the most efficient coal-fired plant on the DEC system with an efficient baseloaded heat rate ranging from approximately 8,700 Btu/kWh to 9,200 Btu/kWh. The certificate was conditioned on the following: (1) the retirement of old, less efficient, uncontrolled Cliffside Units 1 through 4, which totaled 198 MW; (2) a commitment by DEC to invest 1% of its annual retail electric revenues in energy efficiency (EE) and demand-side management (DSM) programs; and (3) a commitment by DEC to retire other older, inefficient, uncontrolled coal-fired generating units, in addition to Cliffside Units 1 through 4, on a MW-for-MW basis, considering the effect on reliability, for actual load reductions realized from new energy efficiency and demand-side programs up to the MW level added by the new supercritical pulverized coal facility. In the air permit issued by the North Carolina Department of Environment and Natural Resources Division of Air Quality (DAQ) for Cliffside Unit 6, DAQ required DEC to: (1) implement a Greenhouse Gas Reduction Plan and to retire 800 MW of additional old, inefficient coal capacity without regard to achieving a commensurate level of MW savings from new EE and DSM programs; (2) accommodate to the extent practicable the installation and operations of future carbon control technology at Cliffside Unit 6; and (3) take additional

actions as necessary to make Cliffside Unit 6 carbon neutral by 2018. The addition of Cliffside 6 and the retirement of the older plants and other required measures will substantially reduce harmful emissions, including GHG. Cliffside 6 came on line on time and under the budgeted cost of \$1.8 billion. DEC has added natural gas-fired generation at its Buck and Dan River sites.⁸ These measures taken by DEC have resulted in an overall reduction of NO_x emissions of 80% from 1997 to 2009 and an overall proposed reduction of SO₂ of 75% from 2000 to 2013.

DEP operates eighteen coal-fired units at seven electric generating plants in NC. DEP is in the process of retiring three coal units at its Lee and Sutton facilities and constructing new state of the art efficient natural gas combined cycle units at those sites. DEP also plans to retire its remaining uncontrolled plants in North Carolina by 2015. DEP will retire eleven coal units at the Lee, Sutton, Weatherspoon and Cape Fear sites, and DEP will replace approximately 1500 MWs of unscrubbed coal with 1500 MWs of state of the art gas fired generation.

DEP had three coal-fired units of 400 MW at its Lee site in Wayne County with no desulfurization device. To comply with CSA, DEP would have been required to scrub the 400 MW. DEP applied for a CPCN for 950 MW of combined cycle gas capacity at the Lee (Wayne County) site to comply with CSA without retrofit. In its CPCN Order the

⁸ At the end of 2013, the Commission began an investigation of the electric and natural gas interdependencies in Docket No. M-100, Sub 135 to make sure increased reliance on natural gas-fueled power plants receive adequate supplies of natural gas from the pipelines at times of high demand on the pipelines. On February 18, 2014, the Commission issued an order scheduling a technical conference to discuss, among other things, whether the state's electric and gas utilities have adequately planned for the potential of a gas pipeline disruption.

Commission required DEP to submit a plan to retire 550 MW (950-400) of coal-fired capacity and submit a plan for replacing the retired capacity. DEP submitted a plan showing conversion of 600 MW coal-fired Sutton (Wilmington) plant to natural gas. DEP subsequently filed a CPCN to that effect. DEP's plan also showed retiring five units at Cape Fear (Chatham) and Weatherspoon (Robeson) with total capacity of 500 MW. Their capacity would be replaced with 550 MW of gas-fired generation at Lee and avoided compliance with anticipated environmental requirements and conversion of ash ponds to dry storage or new ash ponds.

As a result of this combination of measures, DEC and DEP have retired over 2,800 MW (summer capacity) of older fossil fuel generating resources since 2011, including over 2,400 MW of coal generation. By the end of 2015, an additional 900 MW of coal-fired generating resources will be retired, bringing the total to almost 3,800 by the two utilities. At that time, all remaining utility-owned coal generating facilities will have NO_x and SO₂ emissions controls in place. In addition to these retirements, DEC and DEP recently completed or have planned over 265 MW of uprates at its nuclear facilities. At its remaining electric generating facilities, DEC and DEP have taken measures to improve the heat rate or made other changes to improve the efficient operations of those facilities. This effort is a continual process to ensure both reliability and cost-effectiveness. Heat rate reductions reduce GHG emissions.

Recent General Rate Case Activity

As a result of these actions, as well as other compliance measures, DEC filed its first of three general rate cases in 2009. DEC stated that from 2006 to 2008, DEC had placed into service approximately \$2.8 billion in gross electric plant, and projected that the increase in gross plant would grow to \$4.8 billion by September 30, 2009, when coupled with construction work in progress (CWIP). These investments included the purchase of an additional ownership in the Catawba Nuclear Station, the addition of flue gas desulfurization equipment in the Allen Steam Station; CWIP related to the Cliffside Modernization Project, investments in transmission and distribution system and its existing generation fleet related to significant upgrades, refurbishment, reliability, environmental and other regulatory compliance, and relicensing, as well as \$1 billion associated with CSA costs that have been recovered through amortization. DEC requested an increase of 12.6%, and the Commission approved a cumulative increase of approximately 8% spread over three years to lessen the impact of the increase on consumers.

In 2011, DEC filed its second rate general case. This request was driven by the \$4.8 billion of capital invested in the "bricks and mortar" projects of the Company, including the Company's modernization program that consisted of retiring, replacing and upgrading generation plants and transmission and distribution systems. DEC stated that the modernization program was necessary to continue safely providing reliable and environmentally compliant electricity at reasonable costs and that the case was a

continuation of the modernization of the 2009 general rate case. The \$4.8 billion in capital investment included major projects, such as: the Cliffside Unit 5 Scrubber (\$565 million); Cliffside Unit 6 (financing costs associated with \$641 million additional investment); Tornado/High Energy Line Break work at Oconee Nuclear Station (\$135 million); Buck Combined Cycle Project (\$700 million); Bridgewater Powerhouse Replacement Project (\$180 million); transmission and distribution (approximately \$1 billion); and nuclear fuel (\$207 million). DEC requested an increase of approximately 15.2%, and the Commission approved an increase of 7.21%.

In 2013, DEC filed its third general rate case that DEC filed to recoup the \$3.8 billion in capital investment since the 2011 general rate case used to further implement its modernization project of retiring, replacing and upgrading generation plants and transmission and distribution systems. The \$3.8 billion investment included: the Company's new Unit 6 at Cliffside Steam Station (\$863 million); the Dan River Combined Cycle generating facility (\$673 million)(a 620 MW natural gas facility); the Tornado/High Energy Line Break work at Oconee Nuclear Station (\$448 million); and uprates at McGuire Nuclear Station (\$203 million), which included a series of projects that add carbon-free nuclear generating capability to the Company's fleet. DEC requested an increase of approximately 9.7%, and the Commission approved a cumulative increase of 5.1% spread over three years, with a 4.5% increase in year one, no increase in year two, and a 0.6% increase in year three. The purpose of the deferral of the full authorized increase was to mitigate the impact of the increase on consumers.

In 2012, DEP also filed its first general rate case in 25 years. DEP's rate case was driven by capital investments of approximately \$2.3 billion for the Company's modernization program, which consisted of replacing, upgrading and retiring generation plants and transmission and distribution systems. As noted above, the major projects included: early plant retirements and gross plant additions such as in-service costs for two new natural-gas fueled facilities, as well as CWIP for a third natural gas-fired plant under construction (\$257 million); and increased expenses related to nuclear operations (\$33 million). The Company stated that the modernization was needed to comply with environmental requirements of federal and state regulations and laws, including CSA. DEP requested an increase of approximately 11%, and the Commission approved a cumulative increase of 5.5% spread over two years, with a 4.6% increase in year one and a 0.9% increase in year two. As with DEC, the deferral was to lessen the impact of the increase on consumers.

The last North Carolina IOU, Dominion, also filed a general rate case in 2012. The request was driven in part by two new generation facilities, the 590 MW Bear Garden Power Station, which is a facility powered by natural gas and using combined cycle technology, and the 585 MW Virginia City Hybrid Energy Center, which is a facility powered by clean coal technology supplemented by renewable biomass. Dominion requested an increase of approximately 19.11%, and the Commission approved an increase of 6.82%.

Each of these cases was resolved through rate orders that substantially reduced the increases the Companies requested so as to comply with legislative and court-imposed mandates that rates be set as low as possible without impairing constitutional rights of investors that property confiscation be avoided.

Renewable Energy Portfolio and DSM/EE Activity

In addition to the investments in fossil fuel and nuclear-fired plants, North Carolina has invested in diversifying its generation portfolio by encouraging the expansion of alternative energy sources like renewable energy resources, demand-side management and energy efficiency. In 2007, the General Assembly enacted the North Carolina Renewable Energy and Energy Efficiency Portfolio Standard (also referred to as Senate Bill 3)⁹ which, among other things, established a Renewable Energy and Energy Efficiency Portfolio Standard (REPS), the first renewable energy portfolio standard in the Southeast. Under the REPS, all electric power suppliers in North Carolina must meet an increasing amount of their retail customers' energy needs by a combination of renewable energy resources (such as solar, wind, hydropower, geothermal and biomass) and reduced energy consumption. The general REPS requirement increases from 3% of the prior year's retail sales in 2012 to 10% by 2018, then to 12.5% by 2021 (for electric public utilities). The REPS also contains carve outs for specific energy sources, including a carve-out for solar energy. The legislation authorizes utility cost recovery for costs incurred to acquire renewable generation or to acquire Renewable Energy Credits (RECs), plus the costs and incentives for DSM and EE through annual

⁹ Session Law 2007-397.

riders. However, mindful of the impact on customers' rates, caps exist on the levels of costs allowed for recovery through these riders. Additionally, the North Carolina Legislature has approved a 35% renewable energy tax credit to promote renewable energy development.

The Duke Energy, Progress Energy merger approved in 2012 permitted a Joint Dispatch Agreement between the two systems that results in coordinated dispatch of all of the production plants in the Carolinas, reducing fuel costs as well as emissions and future increases in consumers' rates. In its order approving the merger and a subsequent order following an investigation into post-merger activities, the Commission has required guaranteed fuel savings to North Carolina ratepayers of approximately \$480 million.

The investor-owned utilities in the state indicated in their 2013 Integrated Resource Plans that their demand-side management (DSM) and energy efficiency (EE) programs will assist in reliable and affordable electricity. DEC indicates that DSM and EE programs, combined with the use of renewable energy resources, are expected to meet approximately one-third of its projected growth in demand over the next 15 years, equivalent to over 2,400 MW of electric demand, or the output of three large natural gas-generation facilities or three new coal-fired units like Cliffside 6. Using aggressive marketing and increased adoption of energy efficiency measures reduces DEC's annual forecast demand growth from 1.9% to 1.5%. DEP indicates that DSM and EE programs, combined with the use of renewable energy resources, are expected to meet

approximately 20% of its projected growth in demand over the next 15 years, equivalent to over 1,000 MW of electric demand, or the output of a large coal or gas baseload generation facility. Using aggressive marketing and increased adoption of energy efficiency measures reduces DEP's annual forecast demand growth from 1.7% to 1.4%. Dominion, which has a small service area in northeastern North Carolina, forecasts that its DSM programs will result in a total system-wide capacity reduction of 544 MW.

Under the Commission's oversight, North Carolina has established an independent non-profit organization entitled Advanced Energy to investigate and implement new technologies for distributed generation, load management, conservation and energy efficiency. In addition to creating means for sustainable energy-efficient economic development for North Carolina ratepayers, it offers program design and implementation, consulting, training and research to provide market-based energy-related solutions in the areas of applied building science, motors and drives testing, and industrial process technologies. Under Advanced Energy is North Carolina's Green Power program (NC GreenPower), receiving voluntary contributions on consumers' utility bills and otherwise to subsidize renewable and GHG reduction measures. Commission issued rate orders and combination approval orders have provided funding of \$2 million to NC GreenPower.

North Carolina's Energy Challenges

This strategy that North Carolina and its IOUs have invested in is a true “all of the above” strategy in an attempt to balance expenditures for environmental protection with affordable, reliable electric service. Michael Levi, in his book The Power Surge, succinctly encapsulates North Carolina's strategy, which is one that embraces “advances in old and new energy sources alike to realize economic, security and environmental gains, by ... unleashing development across a range of energy sources ...” Michael Levi, The Power Surge, p. 205 (Oxford United Press, 2013). North Carolina has and is investing in both advances in fossil fuels and alternative energy sources at the same time. Michael Levi goes on to state “[p]artisans on both sides of the battle over the future of American energy are often convinced that the only route to victory for their side is through defeat for the other, a phenomenon exacerbated by the time-tested tendency to use energy issues as proxies for bigger ideological fights.” Id. The author goes on to state that there is reason behind this thinking by past actions of both sides. However, to move the country forward, there needs to be a re-building of trust. He states that the start of this can be accomplished by small deals that benefit both sides. An example of building trust and moving forward on both fronts at once is looking at environmental compliance issues and making sure that federal environmental rules and regulations do not promote alternative energy sources at the expense of and defeat of fossil fuels. Otherwise, the costs to reliability and affordability will be too great.

Clearly, North Carolina ratepayers have already invested significant costs in updating North Carolina's generation fleet to meet increasing environmental standards in the least cost manner to provide reliable electricity. However, the EPA has indicated more regulation on fossil fuels is forthcoming.

Pending and/or potential environmental regulation can be broken down into air regulation, water regulation and waste regulation. The air regulations are the new source performance standards for new power plants and new source performance standards for existing power plants, the mercury and air toxic standards (MATS), and the cross state air pollution rule (CSAPR). Water regulations include Section 316(b) of the Clean Water Act and the steam effluent limitations guidelines (ELG), and the waste regulation involves the potential regulation of coal combustion residuals or coal ash. While these regulations serve important environmental goals, one must ask if the benefits outweigh the costs and are the standards achievable. First, the potential costs for DEC and DEP to comply with these regulations between 2014 and 2016 are anticipated to be \$520 million for air, \$150 million for water and \$330 million for waste. More importantly for North Carolina is the feasibility of meeting the requirements of carbon capture and sequestration. North Carolina is one of the sixteen states that lack geological formations that could serve as the basis for potential carbon dioxide (CO₂) reservoirs.

According to the authors of A Critical Review of the Benefits and Costs of EPA Regulations on the U.S. Economy, the annualized compliance costs per year for North

Carolina to comply with the Utility MACT, Boiler MACT and CCR EPA rules is \$854.5 million. Nam D. Pham, Ph.D and Daniel J. Ikenson, A Critical Review of the Benefits and Costs of EPA Regulations on the U.S. Economy November 2012, at 22. Further, “[t]he North American Electric Reliability Corporation estimated that Utility MACT could force the early retirement of 15 gigawatts (GW) of generating capacity” in the nation. Id. at 16.

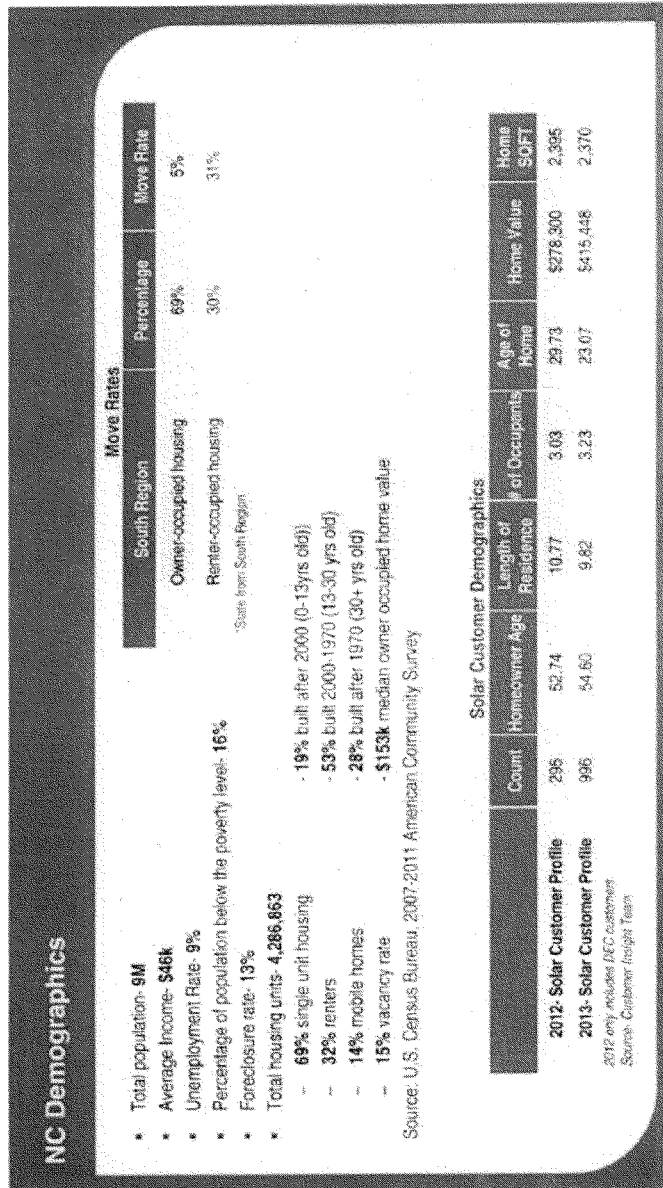
The effects of these dynamics on employment and wages are crucial cost considerations systematically neglected by the EPA. Given the Agency’s focus on improved morbidity and mortality rates as transmitter of the benefits of its regulations, the EPA should consider the adverse impact of unemployment and reduced wages on those health outcomes as costs.

Id.

While each state is situated differently and faces its own unique set of issues, North Carolina has been forward-thinking in its efforts to comply with all federal air quality regulations and to improve the air quality of its citizens. These efforts have both avoided and significantly reduced NO_x, SO₂ and CO₂ emissions from fossil fuel electric generating units. These efforts came at a significant investment cost, which ratepayers will continue to bear over the coming decades. To reiterate, over the past five years North Carolina has experienced five general rate cases, which increased rates in part to implement these environmental goals. These actions taken by North Carolina have thus far appropriately and rationally balanced the environmental goals and the costs associated with them. To add additional costs on North Carolina ratepayers for compliance with proposed and future environmental regulations will be a heavy burden on North Carolina ratepayers and should be undertaken with great care and

forethought. Adding potential unwarranted additional costs on the ratepayers will threaten reliability and the health, safety and welfare of North Carolina's citizens.

With interests of North Carolina ratepayers in mind, North Carolina would hope future federal requirements would recognize the steps North Carolina has taken in the past, would not impose requirements that fail to give North Carolina proper credit for what it has accomplished, e.g. imposition of one size fits all requirements, would avoid stranded costs, and recognize that diversity of production resources and demand resources should be facilitated.



**STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH**

DOCKET NO. E-7, SUB 989

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of
Application of Duke Energy Carolinas, LLC)
for Adjustment of Rates and Charges) ORDER ON REMAND
Applicable to Electric Utility Service in North)
Carolina)

BY THE COMMISSION: On June 1, 2011, pursuant to Commission Rule R1-17(a), Duke Energy Carolinas, LLC (Duke Energy Carolinas, DEC, or the Company),¹⁰ filed notice of its intent to file an application for a general rate adjustment. On July 1, 2011, DEC filed its Application for Adjustment of Rates and Charges Applicable to Electric Service in North Carolina (Application) along with a Rate Case Information Report using Form E-1 (Form E-1), and the direct testimony and exhibits of numerous supporting witnesses. Supplemental, intervenor, and rebuttal testimony was filed in this Docket, all as set out in the Commission's January 27, 2012, Order Granting General Rate Increase (Rate Order), and public and evidentiary hearings on the Application were held by the Commission, also as set out in the Rate Order.

The North Carolina Attorney General appealed the Rate Order. On April 12, 2013, the North Carolina Supreme Court Reversed and Remanded. State ex rel. Utils. Comm'n v. Attorney Gen. Roy Cooper, ____ N.C. ____, 739 S.E.2d 541, 546-47 (2013) (Cooper).

Based upon consideration of (i) the Cooper decision, (ii) the comments and proposed findings and conclusions submitted by the parties after the Cooper decision, and (iii) the pleadings, testimony, and exhibits received into evidence at the hearings, the Stipulation¹¹, and the record as a whole, the Commission makes the following findings to supplement the January 27, 2012, Order in this docket:

SUPPLEMENTAL FINDINGS

The Commission Conducted Hearings Across the DEC Service Area to Receive
Customer Testimony

1. The Commission received extensive testimony from public witnesses illustrating the difficult economic conditions facing many customers, and detailing the impact the projected 15% rate increase would have upon customers. The Commission held six hearings throughout the Company's North Carolina service territory to receive public testimony. Of the 1.8 million Duke Energy Carolinas retail customers in North

¹⁰ Duke Energy Carolinas is a wholly owned subsidiary of Duke Energy Corporation (Duke Energy).

¹¹ On November 28, 2011, Duke Energy Carolinas and the Public Staff, representing the using and consuming public, entered into a stipulation resolving all issues between them.

Carolina, 236 public witnesses testified at the hearings, many of whom testified that the rate increase was not affordable to many customers, including the elderly, persons on fixed incomes, persons with disabilities, the unemployed and underemployed, and the poor. A sampling of public witness testimony is summarized below. Notably, however, some customers also expressed the view that the Company should be required to discontinue its fossil fuel and nuclear generation in favor of energy efficiency and renewables, even if reliance on renewables is more expensive. (See, e.g., Charlotte Tr., p. 20.)

2. At the public hearing in Charlotte, June Blotnik testified that for Duke to seek a higher rate of return for investors was "a slap in the face to ... the 95,350 unemployed people in our region." (Id. at 68.) Ms. Blotnik further testified that "Charlotte is one of the top ten foreclosure hot spots in the country. In neighboring Union County, the sheriff's office is serving 400 foreclosure notices a month. In 2007, they served less than that during the whole year. Last year they served 5,300 homes foreclosure notices." (Id.)

3. Rogelio Reyes from Charlotte testified, "In this time of recession, this increase will affect our daily lives even more. There are many people who are unemployed and need help rather than an electric bill increase." (Id. at 37.)

4. Steve English, a chiropractic physician from Charlotte, testified that he has "a lot of patients that are unemployed or underemployed that ask me on a monthly basis, sometimes a weekly basis, if they can borrow a few bucks so they can pay their light bill." (Id. at 31.)

5. Yvonne McFetters, a minister from Charlotte, testified, "At this time, our community is reeling from bank bailouts, a crippling economy, long-term unemployment, home foreclosures, lack of health care benefits, high gas prices, school closings, library cutbacks, college students' tuitions and fee increases, seniors on a fixed income and children moving back with their parents because they can't afford to live on their own." (Id. at 57.) She further testified, "In these difficult times, increasing our power bills will stretch many customers to the breaking point like Mr. Reyes and Ms. Hernandez. The breaking point will cause struggling businesses an additional hardship and cost North Carolina businesses and jobs." (Id. at 58.)

6. Robbie Akhere, representing Citizens Charlotte Coalition, testified,

Our senior citizens are struggling on fixed income. There have been no increases in Social Security in the last three years, yet Duke Power wants us to pay a 17 percent rate.

I don't know how many of you are familiar with a place called Crisis Assistance. But it's really become an outpost for Duke Power. Many women and children wait in line beginning at 4:30 in the morning. These doors do not open until 8:00. This morning in the rain, we witnessed again – in the winter I've witnessed it. Ninety percent of them are there to get their Duke lights paid.

(Id. at 100-101.)

7. At the Durham hearing, Bobi Gallagher testified that seniors and those living on fixed incomes worry about being "cut off because of high bills" (Durham Tr., p. 27.) Cindy Soehner, a Duke Energy Carolinas customer who owns a family farm in Chapel Hill, also testified at the public hearing in Durham. (Id. at 79-80.) Ms. Soehner testified,

As a family farm, we are having difficulty paying our expenses and we see that our customers, American families, are also having difficulty paying their expenses. If the electric company raised their rates at this point, it would be like punching all of us when we're already going down.

(Id. at 80.)

8. Harry Phillips from Chapel Hill testified, "I ask you to keep in your hearts these sobering numbers as you mull Duke's latest request. Presently we (North Carolina) rank 44th in the nation in unemployment workers at 10.4 percent. We rank 40th in percentage of people living at or below the poverty line; 21.9 percent of children in North Carolina are classified as impoverished; and 11.6 percent of our seniors live in poverty." (Id. at 78.)

9. Bob Harold testified at the Franklin hearing that he manages a furniture factory in Robbinsville employing 420 full-time associates, the largest employer in the county. He testified, "We spend \$1.2 million a year electricity for Duke now. I feel like the rate increase is too exorbitant. It will put us in a very non-competitive situation. It will increase our electricity bill per year \$180,000." (Franklin Tr., p. 16.)

10. Mr. Harold further testified, "There's not any other industry in Robbinsville. The next closest employer in the county is the Nashville (sic) Park Service, and that's seasonal. It will be very devastating to that area if this facility closed. And this rate increase possibly, possibly, could cause that plant to close down." (Id. at 17.)

11. Ronnie Beale, a Macon County Commissioner, testified that

last year Macon County received from the low income assistance fund, \$487,000. That assisted 1700 families in Macon County. That was fiscal year 2010/2011. In 2011/2012, we're scheduled to receive hopefully \$46,000. That will assist 200 families in Macon County. The biggest check we got during that time was \$72,000 out of the 487. It lasted four and a half hours.

As a county we don't know what we're going to do. We have a very large low-income elderly population. You hear the unemployment rate is 10%. Those of us in the construction industry can tell you the actual rate is much higher. Construction still lags in Macon County. Macon County has depended on the construction business for a long, long time.

(Id. at 19.)

12. Hazle Finley of Franklin, a volunteer with Second Mile Ministries at Holly Springs Baptist Church, testified that she is aware that "the federal funding has been cut

in one area 90% for heating assistance this fall. Our donations, I know, are down, and this has been for two years; and due to the economy mainly." (Id. at 33.)

Ms. Finley also testified that the clients at Second Mile Ministry are

mainly elderly people who are on fixed incomes, unemployed, people who have exhausted their unemployment benefits and are no longer receiving them, as well as those who never qualified. As Commissioner Beale stated, there are many in this county that were working in the building industry, and they have never received any unemployment compensation. So it's a very humiliating thing for them to have to go around to churches asking for assistance to pay their electric bill, rent, get food, things to keep their families going during this time.

Many of them, he alluded to the fact, have sold all of their equipment, including vehicles, heavy duty construction equipment, because they're doing nothing because they have no other income. If you go into the pawn shops, they are full of the tools that the men use for their trades. There just is no work here.

(Id. at 33-34.)

13. Susan Leveille, a customer from Dillsboro, testified at the Franklin hearing, "People are struggling everywhere, and in places where people have always worked hard to make ends meet, the struggle is even more difficult." (Id. at 38.)

14. At the High Point hearing, Donna Lisenby testified that "North Carolinians are struggling in this difficult economy. They're struggling to make ends meet everyday." (High Point Tr., p. 25.)

15. Will Shuford of Greensboro also testified at the public hearing in High Point. (Id. at 66-68.) Mr. Shuford testified that "the single greatest problem this economy is facing right now is to extend high levels of unemployment." (Id. at 67.) He concluded that "as long as we have high levels of unemployment that we're seeing right now, I think that we shouldn't even be discussing a rate increase." (Id. at 68.) Nathan Roberto of Greensboro, also testified at the public hearing in High Point, stating that to ask for a rate increase of the magnitude requested "during the great recession, during economic crisis ... is outrageous." (Id. at 68-69.)

16. Ernest Lankford of Danbury testified, "The economy is in the worst that I have ever seen in my lifetime, and unemployment is at an all-time high. I am retired living on a fixed income. Many of my neighbors are out of work and can't hardly put food on the table for their families. They request -- the request for food from food banks are up to more than 50%. People are hurting. It is not the time for the energy rate increase." (Id. at 73.)

17. Mike Inscore, the Mayor of Wilkesboro, testified that the Wilkes County

unemployment rate as of August of this year was 12.1 percent, as compared to North Carolina 10.5. Our per capita (sic) income is 10% lower than the state average. The state average is \$34,800 and in Wilkes

County it's \$31,300. We have a population below the poverty level of 20.6 percent. We have 13.2 percent of households receiving food stamps. We have citizens in general that are not only feeling the hardship of the effects of this economy, but also they are feeling the despair and, quite honestly, the sense of helplessness. It's very hard for me to hold a public hearing and look out over the faces of those in our audience without understanding the plight that they find themselves in.

(Id. at 82-83.)

18. Jenny Barker of High Point testified,

Another face I want to share with you is a man who has worked very hard, 30 years in that same company. When that company closed, he had nothing. He started over in his life. And he worked for a company -- he was making \$65,000 with that company that company closed. In November of 2009, he lost his job. His benefits run out next month. That is my husband.

There is a person -- this is breast cancer awareness month. There is a person that is struggling with two bouts of breast cancer and had to stop treatment because she could not afford the Cobra payments, and she cannot afford the deductible. She lost three jobs because she had cancer. Her benefits run out in February. She is struggling with the fact that she has been fighting the bank for almost two years to save her home. She cannot pay the medical bills, even \$5 a month, because of unemployment. She pays for gas and food and that is all she can afford. And that is me, folks.

(Id. at 104-105.)

19. Carissa Joines of Winston-Salem testified,

Eleven percent of people in Winston-Salem are at or below the poverty level. These are people that \$20 will make a massive difference. You can ask Duke to look at my account right now and there would be a cutoff of this because I have to choose month to month if I'm going to pay water or electricity, so I rotate them back and forth. And that's just something that commonly occurs in my house to have that. That's not because there's -- of unemployment. It's because of underemployment. Your 40, 50 hours a week for work, and I'm still at the poverty level. So does this hurts me personally, affects my tax base. I'm not -- I know that I cannot afford \$20 extra a month. There's nothing else for me to cut.

(Id. at 93.)

20. Lloyd Cuthbertson, the mayor pro tem of Marion appeared at the Marion hearing on behalf of both the City of Marion and the McDowell County school system. He testified,

Based on recent North Carolina Employment Security Commission data, McDowell County has an unemployment rate of 12.8%, which is 2.4%

higher than the state rate of 10.4%. According to US Census data, 16.6% of the citizens of Marion are 65 years of age or older. That's compared to 12.9% for North Carolina and 12.9 for the United States. Even more telling is that medium household income of \$28,665 for city residents is \$6,930 below the county average, \$15,080 below the medium average household income for North Carolina, and \$21,556 below the national medium income. Per capita data income for residents of Marion is \$17,126, which is \$1,647 below the county average, \$7,421 below the state average, and \$9,915 below the national average. Also 22.4% of the residents of city residents live below the poverty line compared with 17.8% in McDowell County.

(Marion Tr., p. 27.) He further testified, "For Marion and McDowell County, the recession is not over." (Id. at 26-28.)

21. Similarly, Bob Boyette, the City Manager of Marion testified, "The City of Marion simply cannot absorb such rate increases, nor can our households, businesses, industries or non-profit organizations." (Id. at 37.)

22. Suzanne Johnson of Nebo in McDowell County testified, "Today in a project that I am doing for the county, I learned that over 50% of K-12 public school students receive free lunches. That means they are below the poverty level. An increase like this on these families is going to be devastating. Don't make them choose between heating and eating." (Id. at 58.)

23. Elizabeth Lawly of Marion testified, "I ask the Utilities Commission to consider the jobless rate in McDowell County. And people on fixed incomes -- my husband and I have a great friend, and you know how she heats her house in the winter time? With one kerosene heater, and she lives in one room with a kerosene heater." (Id. at 60.)

24. Carol Shaver of Rutherfordton testified, "The current unemployment rate in Rutherford County is 14.8% while the overall current unemployment rate for our state is 10.4%. Our state unemployment rate is 1.3% point higher than the national average... Children and families are living in campers beside their parent's home." (Id. at 46-47.)

25. Ms. Shaver further testified, "There are people who are trying to decrease the amount of spending where they can decrease it so that they can provide food, clothing and water, just the basic needs. Please do not allow a rate increase for Duke Energy at this time." (Id. at 49-50.)

26. At the public hearing in Raleigh, Miriam Thompson testified in opposition to the requested rate increase, stating "The residential ratepayers and most of the businesses in this state are still in the worst economy we have seen since the great depression." (Tr. Vol. 1, p. 23.)

27. Gene Nichol of Chapel Hill, the director of the UNC Poverty Center testified,

North Carolina has been, for three years, in an economic depression. Last year a record 17.5 percent of us lived in poverty, the most in raw

numbers, 1.6 billion, in our state's long history. The highest on a percentage basis in many decades. Our poverty rate is worse for our children, one in four living in stark poverty. Almost 40 percent of our children are colored. Over a third of North Carolinians live below or just above the federal poverty line characterized by the federal government as poor or near poor, making less than \$31,000 a year for a family of four. At least 20 percent of us at present are under-employed. Our median income last year fell by over 12 percent. We saw the sharpest decline in healthcare coverage in the nation.

We learned last week that we have the sixth highest rate of what is euphemistically called "food hardship" in the country. Over 2.2 million Tarheels last year had a difficult time putting food on the table. Almost 900,000 of us have been added to the food stamp rolls since the recession began. 900,000 that's more than live in the City of Charlotte. And there is no end to this in sight.

(Id. at 46-47.)

28. Phil Carson of Bryson City, a Swain County Commissioner, traveled from Bryson City and testified at the Raleigh hearing. He testified that Swain County has

unemployment skyrocketing to 12 percent. We have 17 percent of our families are in poverty. Half of the households in Swain heat with electric heat. Most households, their spouses have to work two jobs to make ends meet. And there's approximately seven to eight hundred homes that heat with wood, because they can't afford to heat with electricity.

And, again, I just feel like that the rate increase that was requested at this time, if our country were not in a recession anyway and our economics were good, might not be a bad time. But at this time, it's just not the time.

And I appreciate the Commission's concern and appreciate what you do keeping our rates low so that we can afford them and afford to feed our families as well."

(Id. at 59-60.)

Summary of Findings on Rate of Return Evidence from Evidentiary Hearing

29. The Company in its Application requested approval for its rates to be set using a rate of return on equity of 11.5%, which was adjusted to 11.25% by Company witness Hevert in his rebuttal testimony. Public Staff witness Johnson recommended a rate of return on equity of 9.25%. CUCA witness O'Donnell recommended a 9.5% rate of return on equity. The Stipulation entered into between the Company and the Public Staff prior to the evidentiary hearing provides for a rate of return on equity of 10.5%.

30. Company witness Hevert testified in support of the Company's original request as stated in the Application. In his direct testimony, he recommended a rate of return on equity of 11.5%, which was slightly above the midpoint of his recommended range of 11% to 11.75%. (Tr. Vol. 3, p. 254.) Based on the updated data and analyses

contained in his rebuttal testimony, he decreased his rate of return on equity range to 10.75% to 11.5%, and revised his recommended rate of return on equity to 11.25%. (Id. at 254-55.)

31. Mr. Hevert testified that the rate of return on equity, or cost of equity, is the return that investors require in order to be compensated for the risks associated with owning common equity. (Id. at 255.) Unlike the cost of debt, the cost of equity is neither contractual nor observable, and must be estimated based on market data. (Id.) Mr. Hevert relied on both the Discounted Cash Flow (DCF) and the Capital Asset Pricing Model (CAPM) to estimate the cost of equity, although he placed greater weight upon the results of the DCF approach. (Id.) He explained that since both financial models produce a range of quantitative results, the question becomes where the Company's cost of equity lies within that range. (Id.) To inform that decision, Mr. Hevert considered both capital market and company-specific risks in determining the Company's return on equity. (Id. at 255-56.) In his direct testimony, Mr. Hevert concluded that those factors suggested a rate of return on equity slightly above the midpoint of his range. (Id. at 256.)

PLACE: Dobbs Building, Raleigh, North Carolina

DATE: November 28, 2011

DOCKET NO.: E-7, Sub 989

TIME IN SESSION: 1:00 P.M. TO 3:37 P.M.

BEFORE: Chairman Edward S. Finley, Jr.
Commissioner Bryan E. Beatty
Commissioner William T. Culpepper, III
Commissioner ToNola D. Brown-Bland
Commissioner Susan W. Rabon
Commissioner Lucy T. Allen

IN THE MATTER OF:

Duke Energy Carolinas, LLC's
Application for a Rate Increase

VOLUME 1

A P P E A R A N C E S :

FOR DUKE ENERGY CAROLINAS, LLC:

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Kendrick Fentress, Esq.
Associate General Counsel
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Heather Shirley Smith, Esq.
Duke Energy
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Charlotte, North Carolina 28202

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1 of us to take a close look at public utilities.
2 I'd love to see them be owned by the public.

3 Thank you.

4 CHAIRMAN FINLEY: Thank you, Ms. O'Rourke.
5 Hold on just a minute. Are there questions?

6 MR. KAYLOR: No questions.

7 CHAIRMAN FINLEY: Questions from any
8 party?

9 (NO RESPONSE.)

10 CHAIRMAN FINLEY: Okay. Thank you, Ms.
11 O'Rourke.

12 (WITNESS EXCUSED.)

13 MS. FORCE: I'm going to call three more
14 witnesses so that you'll be prepared. One is
15 Monserratt Alvarez. The next is Gene Nichol. And
16 the third is Bob Rodriguez. So, Mr. Alvarez.

17 UNKNOWN SPEAKER: Monserratt left.

18 MS. FORCE: Thank you. Okay. Then that
19 would be Gene Nichol.

20 (WHEREUPON, GENE NICHOL WAS CALLED AS A
21 WITNESS, DULY SWORN, AND TESTIFIED AS FOLLOWS:)

22 DIRECT EXAMINATION BY MS. FORCE:

23 Q. If you'd state your name--

24 A. My name is Gene Nichol, G-E-N-E N-I-C-H-O-L. I

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1 live at 104 Pine Lane in Chapel Hill, and I'm a
2 Duke customer.

3 MR. KAYLOR: Mr. Chair, could I inquire as
4 to whether or not--

5 THE WITNESS: No.

6 MR. KAYLOR: --you have testified before.
7 Did you testify at the Durham public hearing?

8 THE WITNESS: No, I did not.

9 CHAIRMAN FINLEY: He did not. This is the
10 first time.

11 MR. KAYLOR: Okay. Excuse me.

12 THE WITNESS: You know, perhaps I should
13 have, but--

14 A. Mr. Chairman, I'm the Director of the UNC Poverty
15 Center. As I said, my name's Gene Nichol. I'm a
16 Chapel Hill resident and a Duke customer. North
17 Carolina General Statutes Section 62.2 empowers,
18 in fact, it requires the Utilities Commission to
19 regulate utilities in the public interest. In its
20 blinkered tunnel vision, Duke Energy makes this
21 task quite a formidable one.

22 North Carolina has been, for three years,
23 in an economic depression. Last year a record
24 17.5 percent of us lived in poverty, the most in

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1 raw numbers, 1.6 billion, in our state's long
2 history. The highest on a percentage basis in
3 many decades. Our poverty rate is worse for our
4 children, one in four living in stark poverty.
5 Almost 40 percent of our children are colored.
6 Over a third of North Carolinians live below or
7 just above the federal poverty line characterized
8 by the federal government as poor or near poor,
9 making less than \$31,000 a year for a family of
10 four. At least 20 percent of us at present are
11 under-employed. Our median income last year fell
12 by over 12 percent. We saw the sharpest decline
13 in healthcare coverage in the nation.

14 We learned last week that we have the sixth
15 highest rate of what is euphemistically called
16 "food hardship" in the country. Over 2.2 million
17 Tarheels last year had a difficult time putting
18 food on the table. Almost 900,000 of us have been
19 added to the food stamp rolls since the recession
20 began. 900,000, that's more than live in the City
21 of Charlotte. And there is no end to this in
22 sight.

23 Against this backdrop, amazingly, Duke
24 Energy asked initially for a residential rate hike

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1 of 18.6 percent. A company, making over a billion
2 dollars a year in profit, says to its customers,
3 draft in monopoly, we understand that you face
4 greater changes in poverty and hunger and loss of
5 healthcare and unemployment and wages than at any
6 time since 1930, but by God, we want our 18
7 percent. We have our plans. We've got our--our
8 expectations.

9 The good news is, thanks to a dramatic push
10 back from enraged citizens that apparently is not
11 going to happen. Under intense pressure, but
12 continuing to play games with people's lives, Duke
13 said that the magic number was, first, 18.6
14 percent, then, apparently 12 percent, then,
15 reportedly, 7.2 percent. We are frantic, in other
16 words, to charge whatever it is we can politically
17 get away with. We will make the numbers show
18 whatever is demanded.

19 This slalom, this charade is a brutal
20 rejection, a frank mockery, of the public interest
21 the Commission is charged to assure. Duke's
22 twists and turns, its contradictions and
23 hypocrisies, its strategic advances and retreats
24 reveal an undisguised disdain for the ratepayers

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1 interests and continuing economic exigency.

2 Duke has shown itself literally unworthy of
3 belief. Any case it now offers for a rate
4 increase should, therefore, be rejected out of
5 hand. Taking money from the too thin pockets of
6 struggling North Carolinians is not a game, even
7 though Duke Power is trying to make it one right
8 before our eyes.

9 Thank you, Mr. Chairman.

10 CHAIRMAN FINLEY: Thank you, Professor
11 Nichol. Let's see if there are questions.

12 MR. KAYLOR: No questions.

13 CHAIRMAN FINLEY: Very well. Thank you
14 for coming.

15 (WITNESS EXCUSED.)

16 CHAIRMAN FINLEY: Call your next witness,
17 please.

18 MS. FORCE: Bob Rodriguez.

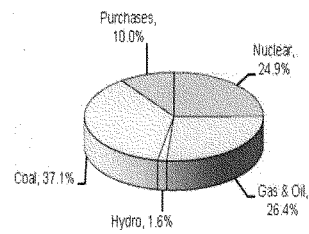
19 MR. KAYLOR: Mr. Chairman, I object. I
20 believe he testified in Durham.

21 CHAIRMAN FINLEY: I don't think he did.

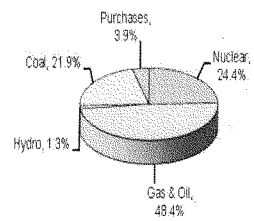
22 MR. RODRIGUEZ: It must have been my twin,
23 but, no--no, sir. I did not testify at the
24 hearing.

Progress Energy Capacity and Energy mix

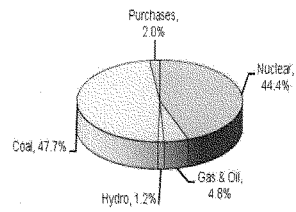
2010 Capacity by Fuel Type



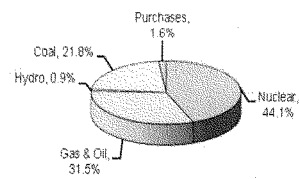
2025 Capacity by Fuel Type



2010 Energy by Fuel Type

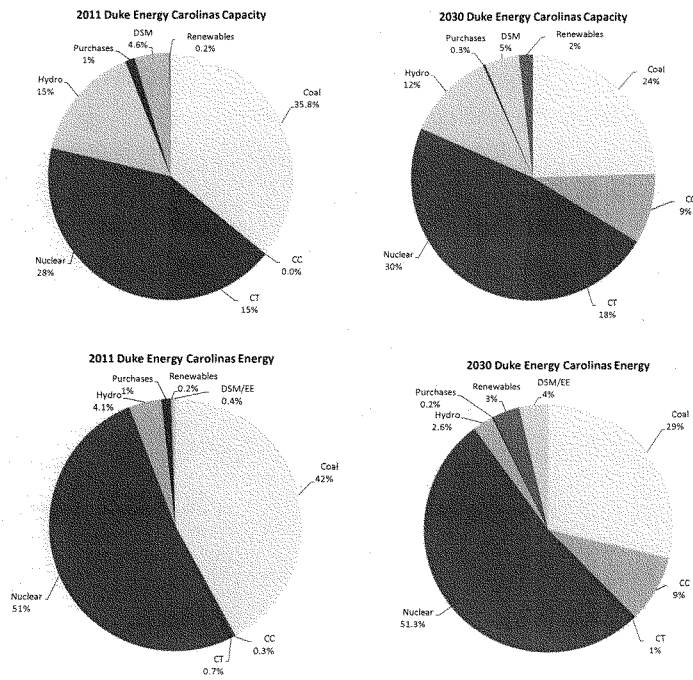


2025 Energy by Fuel Type



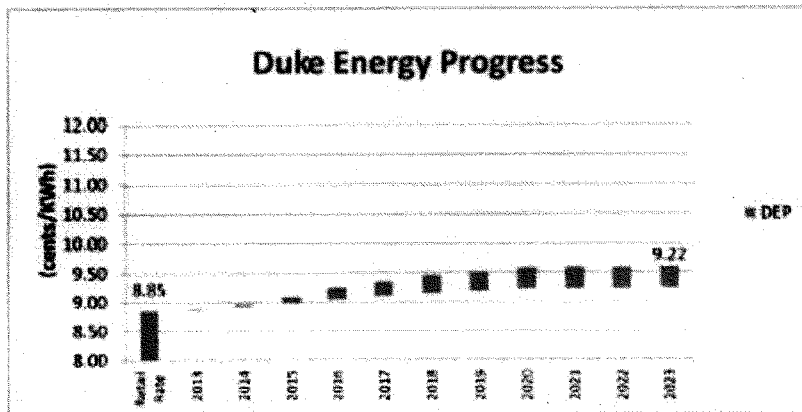
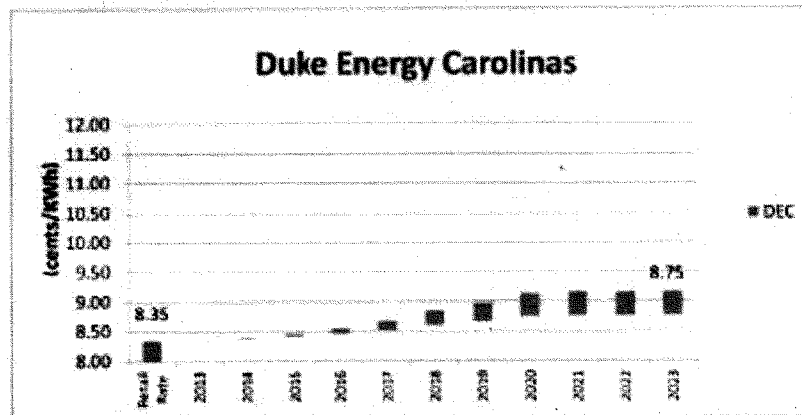
Source: Progress Energy 2010 IRP filing with NCUC on September 1, 2010.

Duke Energy Capacity and Energy mix



Source: Duke Energy 2010 IRP filing with NCUC on September 1, 2010.

Environmental Compliance Costs Average Rate Impact by Jurisdiction



Assumptions

1. Environmental Planning Case from the 2012: 12&0 that includes:
 - Final MATS rule
 - Proposed 316(b), Steam Effluent Guidelines, Coal Combustion Rule, NAAQS
2. Rate Impact calculated using 2012 KWh sales
3. Revenue requirement on environmental capital calculated using a 15% return for each jurisdiction
4. Environmental impacts are calculated using Incremental O&M costs and cumulative capital costs
5. Data excludes costs related to new resources
6. Includes pond closures costs which could be included in existing rates depending on jurisdiction
7. Base retail rate source is EEI Typical Bill rates for 12 months ending January 1, 2013
8. Assumes no changes to 2013 retail rate other than the environmental impacts

December 19, 2013

Ms. Janet McCabe
Acting Assistant Administrator, Office of Air and Radiation
USEPA Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 6101A
Washington, DC 20460

Dear Ms. McCabe:

We are writing on behalf of our three agencies (North Carolina Department of Environment and Natural Resources, North Carolina Utilities Commission and North Carolina Utilities Commission Public Staff) to provide input to the U.S. Environmental Protection Agency (EPA) as you develop proposed guidelines to regulate greenhouse gas (GHG) emissions from existing electric power plants. Your staff participated in a listening session with the North Carolina regulatory agencies on November 7, 2013. We appreciate the opportunity the listening session provided us to express issues and concerns we have as EPA begins the regulatory process. Further, your staff invited North Carolina to submit written comments addressing the four main questions EPA has posed to States in order to assist in the development of the proposed guidelines. Thank you for the opportunity to provide written comments that may help shape this process. While our comments below address practical concerns and your specific questions regarding the development of proposed guidelines, they should be read with the knowledge that we continue to have overarching concerns regarding EPA's legal authority.

As we will discuss further, North Carolina has undertaken various initiatives and invested significant resources that have limited greenhouse gas emissions from the utility sector. The Clean Smokestacks Act (Session Law 2002-4) is one of the primary pieces of legislation adopted by the North Carolina General Assembly that limited emissions from North Carolina's coal power plants. A significant part of the legislation entailed the cost recovery feature for the installation of emission controls for sulfur dioxide and nitrogen oxides. Rate paying customers in North Carolina have invested over \$2.5 billion in these controls over the last decade, and continue to pay tens of millions in annual expenses to operate and maintain these emissions control systems. In light of this significant investment, our agencies believe that the proposed guidelines should not reduce the remaining useful life of these coal fired power plants that are already equipped with state-of-the-art emission controls. This will allow a return on this public investment and ensure these well controlled coal-fired power plants are part of a balanced "all-of-the-above" energy plan in North Carolina. EPA's guidelines must not disrupt balanced state energy policies or effectively penalize a state for voluntarily taking actions that provided meaningful emission reductions ahead of any EPA action.

Further, our agencies believe that it is possible to balance our environmental needs with the delivery of reliable, cost-effective electricity and the proposed guidelines should allow states the flexibility to achieve these goals. Maintaining fuel diversity is a long-standing policy goal of the State and practice of North Carolina electric generators and is important for both economic and national security purposes. The guidelines should allow flexibility to continue promoting fuel diversity, which in turn promotes grid reliability. Ensuring the reliability of our electric grid is critical and the electric generating facilities in North Carolina play an important role in the reliability of the regional electric grid.

Selection of the most economically reasonable means of compliance is critical. It is no secret that the economic recovery across the United States is fragile and many ratepayers struggle to pay their monthly bills, including their utility bills. Guidelines that impose significant capital investment or other compliance costs will put significant upward pressure on utility rates for all customers since utilities are legally authorized to recover such costs from their customers. We strongly encourage EPA to be exceedingly mindful of the financial impact the proposed guidelines will have on the customers that will ultimately bear the cost of compliance.

Additionally, EPA should critically evaluate the current state of commercially practical and available technologies for mitigating or reducing CO₂ emissions from existing electric generating plants. While some experimental technologies for CO₂ removal may exist, these technologies are not currently cost effective or available on a commercially viable scale. While carbon capture and sequestration is cited by EPA as a viable option for CO₂ removal, North Carolina does not believe carbon capture and sequestration has been adequately demonstrated. The EPA must recognize the limited geological deposits that could be used for carbon capture and sequestration. North Carolina is one of sixteen states that lack geological formations that could serve as the basis for potential CO₂ storage reservoirs. In light of this critical limitation, EPA must not mandate the implementation of CO₂ capture and storage for existing electric generating plants.

Finally, the approach ultimately adopted by EPA should be legally defensible and capable of withstanding the inevitable litigation that will ensue. Developing the plan to meet the requirements of Section 111(d) will require an investment of significant resources by all of our agencies and the regulated community. We want the ultimate product to be an effective plan that provides regulatory certainty without protracted litigation. North Carolina believes that the plain language of Section 111(d) requires the best system of emission reduction be based on measures that are achievable at a given emission unit (i.e., within the fence line). North Carolina strongly urges the EPA to follow the statute and provide a guideline based on the plain language of the Clean Air Act.

The joint responses of the North Carolina Department of Environment and Natural Resources, North Carolina Utilities Commission and North Carolina Utilities Commission Public Staff to the questions posed in your document entitled, "Considerations in the Design of a Program to Reduce Carbon Pollution from Existing Power Plants" are attached in Appendix A to this letter.

Thank you again for the opportunity to provide input to this important regulatory process. We look forward to working with EPA during the development and implementation of the Section 111(d) guidelines. We trust that our comments will be considered as EPA develops the proposed guidelines.

Sincerely,



John E. Skvarla, III
Secretary,
NC Department of Environment
And Natural Resources



Edward S. Finley, Jr.
Chairman
North Carolina Utilities
Commission



Christopher J. Ayers
Executive Director
NCUC Public Staff

Appendix A

1. What is North Carolina's experience with programs that reduce CO2 emissions in the electric power sector?

We preface the inclusion of the following discussion by underscoring our belief that the best system of emission reduction must be defined within the fence line of a given subject emission source. However, North Carolina does believe that states have the flexibility to consider measures outside the fence line as part of a compliance strategy under Section 111(d).

North Carolina has been an early mover on air quality and energy issues that directly or tangentially aid in greenhouse gas emission reductions, as evidenced by the following actions taken over the past decade:

- In 2002, the North Carolina General Assembly enacted *The Clean Smokestacks Act* (S.L. 2002-4), which called for significant reductions of sulfur dioxide (SO₂) and oxides of nitrogen (NO_x) emissions from coal-fired facilities in the State and also resulted in significant reductions in mercury emissions. As a result of Clean Smokestacks compliance and other environmental control measures, rate paying customers in North Carolina have invested over \$2.5 billion in state of the art emissions controls for NO_x and SO₂ at the 7 largest coal-fired facilities in the State over the last decade, and continue to pay tens of millions in annual expenses to operate and maintain these emissions control systems. In 2005, as amended in 2009, the North Carolina *Utilities Commission in Docket No. E-100, Sub 183*, adopted policies to allow for net-metering from distributed generation facilities, including residential solar. The Commission defined net-metering as "A billing arrangement whereby a customer that owns and operates an electric generating facility is billed according to the difference over a billing period between the amount of energy the customer consumes and the amount of energy the customer generates."
- In March 2007, the Utilities Commission granted Duke Energy Carolinas (DEC) a certificate of public convenience and necessity to construct an 800 MW supercritical pulverized coal-fired generating facility (Cliffside 6) as part of its Cliffside Modernization Project. Since it began commercial operation in December 2012, Cliffside 6 has demonstrated that it is the most efficient coal-fired plant on the DEC system with a baseloaded heat rate ranging from approximately 8,700 Btu/kWh to 9,200 Btu/kWh.¹ The certificate was conditioned on the following: (1) the retirement of existing Cliffside Units 1 through 4, which totaled 198 MW; (2) a commitment by DEC to invest 1% of its annual retail electric revenues in energy efficiency (EE) and demand-side management (DSM) programs; and (3) a commitment by

¹ By reference, the baseloaded heat rates of DEC's other coal-fired facilities, which are already among the most efficient in the United States, are 5%-10% higher than for Cliffside 6. According to a January 22, 2009, report by Sargent & Lundy LLC entitled "Coal-Fired Power Plant Heat Rate Reductions," the average heat rate among U.S. coal-fired power plants is approximately 10,400 Btu/kWh, or 13% to 20% higher than for Cliffside 6.

DEC to retire other coal-fired generating units, in addition to Cliffside Units 1 through 4, on a MW-for-MW basis, considering the effect on reliability, for actual load reductions realized from new energy efficiency and demand-side programs up to the MW level added by the new supercritical pulverized coal facility. In the air permit issued by DAQ for Cliffside Unit 6, DAQ required DEC to: (1) implement a Greenhouse Gas Reduction Plan and to retire 800 MW of additional coal capacity without regard to achieving a commensurate level of MW savings from new EE and DSM programs; (2) accommodate to the extent practicable the installation and operations of future carbon control technology at Cliffside Unit 6; and (3) take additional actions as necessary to make Cliffside Unit 6 carbon neutral by 2018.

- In 2007, the General Assembly enacted the *North Carolina Renewable Energy and Energy Efficiency Portfolio Standard (S.L. 2007-397*, also referred to as Senate Bill 3) which, among other things, established a Renewable Energy and Energy Efficiency Portfolio Standard (REPS), the first renewable energy portfolio standard in the Southeast. Under the REPS, all electric power suppliers in North Carolina must meet an increasing amount of their retail customers' energy needs by a combination of renewable energy resources (such as solar, wind, hydropower, geothermal and biomass) and reduced energy consumption. The general REPS requirement increases from 3% of prior year's retail sales in 2012 to 10% by 2018, then to 12.5% by 2021 (for electric public utilities). The REPS also contains carve outs for specific energy sources, including a carve-out for solar energy. The Commission utilizes the North Carolina Renewable Energy Tracking System (NC-RETS) for tracking and reporting both Renewable Energy Certificates (RECs) and Energy Efficiency Certificates (EECs) used for REPS compliance. NC-RETS is very similar to other renewable tracking systems used in other states. All electric power suppliers complied with their 2012 general REPS requirement, and based on recently filed REPS Compliance Plans for 2013, 2014, and 2015, each supplier should have no difficulty meeting its general REPS obligation in each year. The 2013 North Carolina Utilities Commission Annual Report Regarding Renewable Energy and Energy Efficiency Portfolio Standard in North Carolina is available at the following link: <http://www.ncuc.net/reports/repereport2013.pdf>
- In addition to the REPS, Senate Bill 3 also enacted G.S. 62-133.9, which directs each electric power supplier in the State to "implement demand-side management and energy efficiency measures and use supply-side resources to establish the least cost mix of demand reduction and generation measures that meet the electricity needs of its customers." Significant energy and capacity reductions have already been achieved by electric power suppliers in the State through these DSM and EE programs, and the savings have been validated through rigorous evaluation, measurement, and verification (EM&V) protocols. Additional information on the DSM and EE programs is available in the Commission's September 2013 Report on the Proceedings for Electric Power Suppliers Involving Energy Efficiency and Demand Side Management Programs, Cost Recovery, and Incentives, which is available at the following link: <http://www.ncuc.net/reports/EE-DSM%20Report.pdf>.

- Looking forward, the investor owned utilities in the State indicated in their 2013 Integrated Resource Plans that their DSM and EE programs will result in the following additional changes:
 - Duke Energy Carolinas (DEC) indicates that DSM and EE programs, combined with the use of renewable energy resources, are expected to meet approximately 1/3 of its projected growth in demand over the next 15 years, equivalent to over 2,400 MW of electric demand, or the output of three large natural gas-generation facilities or three new coal-fired units like Cliffside 6. Using aggressive marketing and increased adoption of energy efficiency measures reduces DEC's annual forecast demand growth from 1.9% to 1.5%.
 - Duke Energy Progress (DEP) indicates that DSM and EE programs, combined with the use of renewable energy resources, are expected to meet approximately 20% of its projected growth in demand over the next 15 years, equivalent to over 1,000 MW of electric demand, or the output of a large coal or gas baseload generation facility. Using aggressive marketing and increased adoption of energy efficiency measures reduces DEP's annual forecast demand growth from 1.7% to 1.4%.
 - Dominion North Carolina Power (DNCP), which has a small service area in northeastern North Carolina, forecasts that its DSM programs will result in a total system-wide capacity reduction of 544 MW.
- As a further measure towards promoting renewable energy development in the State, the General Assembly expanded its Renewable Energy Production Tax Credit in 2007, 2009, and 2010 to include geothermal equipment, combined heat and power systems, and extended the expiration date to December 31, 2015. North Carolina has a long history of promoting renewable energy through tax credits. Prior to 1999, credits were available for a myriad of renewable activities, including the purchase of solar equipment and solar installations. S.L. 1999-342 (House Bill 1472) simplified this process creating a renewable energy tax credit. The tax credits state that when a taxpayer has constructed, purchased, or leased renewable energy property and places it in service in the State during the taxable year, the taxpayer is allowed a credit equal to thirty-five percent (35%) of the cost of the property. The tax credit has played an important role in spurring the development and construction of renewable energy projects in North Carolina.
- In 2009, the General Assembly enacted S.L. 2009-390, which made the following findings:
 - (6) The retirement of coal-fired generating units and installation of generating units that use natural gas as the primary fuel will reduce emissions of carbon dioxide (CO₂) and mercury (Hg) significantly more than would the installation of sulfur dioxide (SO₂) emissions controls on the coal-fired generating units.

(7) The retirement of coal-fired generating units that are owned and operated by Progress Energy and located in eastern North Carolina and the installation of generating units that use natural gas as their primary fuel to replace them will reduce emissions of oxides of nitrogen (NOx), sulfur dioxide (SO₂), carbon dioxide (CO₂), and mercury (Hg) more than would the installation of sulfur dioxide (SO₂) emissions controls on the older coal-fired generating units.

The bill established a procedure, effective through January 1, 2011, to streamline the certification and cost recovery process for the retirement of older coal-fired power plants and their replacement with new natural gas generation. S.L. 2009-390 also establishes a procedure under which the cost of purchasing or constructing a "carbon offset facility" (a facility purchased or constructed between July 1, 2009, and July 1, 2014, that uses solar, solar thermal, wind, hydropower, geothermal, or ocean current or wave energy to generate electricity or equivalent BTUs that will replace electric generation so as to reduce GHG emissions from existing fossil generation) can be recovered by the utility through the retention of fuel cost savings until the cost of the facility can be recovered through the utility's base rates established in a general rate case. This authority has not been used to date.

As a result of this combination of measures, DEC and DEP have retired over 2,800 MW (summer capacity) of older fossil fuel generating resources since 2011, including over 2,400 MW of coal generation. By the end of 2015, an additional 900 MW of coal-fired generating resources will be retired, bringing the total to almost 3,800 by the two utilities. At that time, all remaining utility-owned coal generating facilities will have NOx and SO₂ emissions controls in place. The attached **Table 1** provides additional details on these retirements. In addition to these retirements, DEC and DEP recently completed or have planned over 265 MW of uprates at its nuclear facilities, as summarized in attached **Table 2**. At its remaining electric generating facilities, DEC and DEP have taken measures to improve the heat rate or made other changes to improve the efficient operations of those facilities. This effort is a continual process to ensure both reliability and cost-effectiveness.

Another result of these existing policies has been significant growth in the renewable energy sector in North Carolina. Despite having a solar resource that is less than that of many states (See <http://www.nrel.gov/gis/solar.html>) and ranking 28th out of the United States by area, North Carolina currently in 2012 was ranked 5th in the nation in installed solar capacity and ranked 2nd in installations in the second quarter of 2013. The Utilities Commission, as of September, 2013, currently had registered 629 renewable energy projects. Of those 269 are solar photovoltaic projects. Additionally, the North Carolina Department of Revenue reports that in the 2012 fiscal year 1,494 taxpayers utilized the renewable property tax credit accounting for nearly \$28 million.

In conclusion, while each State is situated differently and faces its own unique set of issues, North Carolina has been very forward-thinking in its efforts to comply with all federal air quality regulations and to improve the air quality of its citizens. These efforts both avoided and significantly

reduced NOx, SO2 and CO2 emissions from fossil fuel electric generating units. These efforts came at a significant investment cost, which ratepayers will continue to bear over the coming decades. It is appropriate and fair for the state to consider these actions in defining a compliance strategy under Section 111(d).

a. What actions are states, utilities and power plants taking today that reduce CO2 emissions from the electric power system? How might these be relevant under section 111(d)?

The above listed programs have resulted in the retirement of several coal burning electric generating facilities as well as an increase in the generation of renewable energy and the implementation of energy efficiency and demand side management programs. It is our belief that the best system of emission reduction must be defined within the fence line of a given subject emission source. However, North Carolina does believe that states have the flexibility to consider measures outside the fence line as part of a compliance strategy under Section 111(d).

b. What systems do states and power plants have in place to measure and verify CO2 emissions and reductions?

Several federal and state emissions reporting programs are currently in place to provide continuous measurement and verification of CO2 emission rates and reductions at electric generating units. North Carolina air quality rules, which are aligned with federal rules for the acid rain program, nitrogen oxides emission trading program, and the Clean Air Interstate Rule, provide compliance assurance monitoring for nitrogen oxides and sulfur dioxide. CO2 measurements data are used as diluents to convert pollutant concentrations into mass rates and mass per heat input. Facilities directly report CO2 emissions data to the EPA Clean Air Markets Division and the EPA Greenhouse Gas Reporting Rule. This robust database can be utilized to verify CO2 reductions at a particular electric generating unit.

c. How do state programs and measures affect electricity generation and emissions at a regional level? How are interstate effects accounted for when measuring the progress of a state program? For example, are the multi-state effects of state renewable portfolio standards, end-use energy efficiency resource standards, emissions performance standards, and emissions budget trading programs currently accounted for by the state, and if so, how?

Renewable Energy Certificates created at an electric generating facility that is outside of the State are only eligible to account for up to 25% of the REPS; however, if the electricity is created out-of-state but is dispatched within the State, that generation will be counted as in-state. As North Carolina is the only state in its region to have adopted a REPS, it receives no supplemental benefits from the REPS of any neighboring state.

2. How should EPA set the performance standard for state plans?

North Carolina believes that the most legally defensible interpretation of the definitions and language in Section 111(d) is to evaluate the supply side energy efficiency improvements, or “heat rate improvements” that can be achieved at a given affected unit. It is unclear how states can set standards of performance for any existing source by looking at activities that are outside the boundaries of the source. Additionally, the idea of fuel switching or co-firing a lower-carbon fuel was suggested as an action to be considered in setting the best system of emission reduction. North Carolina believes this action would result in redefining the source, which is not allowable under Section 111(d).

- a. Which approaches to reducing CO₂ emissions from power plants should be included in the evaluation of the “best system of emission reduction” that is used to determine the performance level(s) that state plans must achieve? Should the reduction requirement be source- or system-based?**

North Carolina believes the reduction should be source-based due to the plain language of Section 111(d) as well as legal precedent that precludes EPA and states from designing a standard that relies on reductions made outside of the emissions unit. Any flexibility in compliance with a standard based on a specific emission unit resides with the States, which have the primary responsibility for implementation of this program.

Carbon Capture and sequestration has not been adequately demonstrated. Many environmental groups have asserted that carbon capture and sequestration is a demonstrated technology for existing sources. In considering this assertion, it is necessary to evaluate the characteristics that exist at the Kemper County Energy Facility in Mississippi that might allow this project to be viable. These same characteristics do not exist in many states, including North Carolina.

- b. How does the amount of flexibility that states are given to include different types of programs in their state plans relate to the “best system of emission reduction” that is used to set the performance bar for state plans? For example, if state standards to improve end-use energy efficiency were included in state plans, should EPA consider potential improvements in end-use energy efficiency in setting the performance target for states?**

North Carolina believes that EPA’s guidelines and the performance standards established by the states must be based on what is achievable at the emission source. States may use their limited flexibility in achieving compliance with those standards.

- c. What should be the form and specificity of the performance level(s) in EPA guidelines? (Rate-based or mass-based? Separate levels for each subcategory of sources, or one level for the covered sources in the state? A uniform national level, or different levels by state/region based on an established evaluation process?)**

Since no add-on control technology exists for existing power plants to reduce GHGs, EPA should not establish a single target or standard, and certainly not a uniform national level. North Carolina prefers that the guidelines establish an evaluation process that provides procedures states can follow in defining the performance standard for a given affected source. The states can then do a unit-by-unit evaluation to define a unit specific performance standard. The existing fleet of sources is extremely varied and the heat rate improvements available at any given unit are unique. For this reason, sub-categorization is essential on both a fuel type and boiler design basis. If states have the flexibility to set unit specific performance standards, the relevant factors can be considered in that process. Under this approach, a state could elect to establish a rate-based approach or an equivalent mass-based approach.

d. When can emission reductions from existing power plants be achieved, considering different reduction strategies?

North Carolina believes that the development of the state plan should determine the compliance schedule and should allow for a staggered approach taking into account all relevant factors as the various improvements are undertaken at the affected units across the state.

e. How should a state, in applying a standard of performance to any particular source, consider a facility's "remaining useful life" and other factors?

Most states, including North Carolina, have experience with evaluating remaining useful life since other programs, such as Best Available Retrofit Technology require such an evaluation. In general, states are in the best position to evaluate these factors, and the Clean Air Act leaves such authority to the states.

3. What requirements should state plans meet, and what flexibility should be provided to states in developing their plans?

Section 111(d) requires states to establish performance standards for the existing sources, so the plans should include both the performance standards and the compliance schedule.

a. What level of flexibility should be provided to states in meeting the required level of performance for affected EGUs contained in the emission guidelines?

States should have the flexibility to design their 111(d) plans as afforded to the states under the Clean Air Act. While North Carolina believes the performance standard must be established based on what is achievable at any given emission unit (i.e., inside the fence line), the states do have the flexibility to determine whether to use measures achieved outside the fence line to achieve compliance.

- b. Can a state plan include requirements that apply to entities other than the affected EGUs? For example, must states place all of the responsibility to meet the emission performance requirements on the owners or operators of affected EGUs, or do states have flexibility to take on some (or all) of the responsibility to achieve the required level of emissions performance themselves or assign it to others (e.g., to require an increase in the use of renewable energy or require end-use efficiency improvements, which will result in emissions reductions from affected EGUs?)**

North Carolina believes Section 111(d) plans apply to certain facilities in particular source categories. In this case, fossil fuel fired EGUs will be regulated under these guidelines. Thus, it would make sense that those EGUs have an obligation to demonstrate compliance with the performance standards. North Carolina does not believe it has the flexibility to shift the compliance responsibility or assign it to others. Situations where the EGU is responsible for compliance, but having a part of their compliance plan dependent upon the actions of others under which they have no control, creates an impractical situation for both the regulated entity and the regulator.

- c. What components should a state plan have, and what should be the criteria for approvability?**

The plan should establish performance standards based on the best system of emission reduction. Reasonable compliance dates should also be established. Upon establishing these components, the plan should be approvable. The guidelines are intended to provide procedures that guide the states as states establish performance standards, and as such, states can deviate from the guidelines if appropriate for a given situation.

- d. Can a state plan include programs that rely on a different mix of emissions reduction methods than assumed in EPA's analysis of the "best system of emission reduction" that is used to set the performance standard for state plans?**

The statute appears to allow some flexibility for the states as the plans are developed.

- e. What should be the process for demonstrating that a state plan will achieve a level of emissions performance comparable to the level of performance in the EPA emission guidelines?**

Under Section 111(d), EPA can only establish a unit-specific guideline that describes what control technologies have been demonstrated. Once EPA provides that guideline, section 111(d) allows states to develop unit specific emission standards after considering many factors, including the cost, physical constraints on installing controls, and the remaining useful life of the emission units. As such, the states have flexibility to develop standards of performance for existing units that vary from the guidelines. It is unclear why comparability

to the guideline is suggested, since by design, the actual state plan is intended to allow for consideration of other factors.

- f. What enforceability, measurement, and verification issues might arise, depending on the types of state measures and programs that states include in their plans? For example, what issues are raised by actions that have indirect effects on EGU emissions, such as end-use energy efficiency resource standards, renewable portfolio standards, financial assistance programs to encourage end-use energy efficiency, building energy codes, etc.)?**

A number of states, including North Carolina, do not believe Section 111(d) authorizes the inclusion of operations outside the fence line for purposes of defining best systems of emission reduction. In the theoretical instance where a state chooses to go beyond the fence line to show compliance with an existing source standard, this will introduce several complicating factors. The electricity grid network comprises of many power companies that generate and supply electricity in a given region, and includes activities in multiple states (sometimes partial states). Due to the nature of this complex network of power plants and power lines which operate on the principles of supply and demand at least cost, the amount of electricity displaced in a state due to control measures taken outside of power plants boundaries (e.g., energy efficiency, renewable energy, energy conservation techniques) becomes a challenging and complicated science. Although EPA has developed energy models to quantify the electricity displaced and emissions reduced by such measures, it is unclear how a state would be able to take credit for its own actions in a state plan.

Measurement verification can vary greatly depending on what type program is being implemented. States should be given flexibility to design and implement such a program that integrates all relevant factors and statutory requirements.

- g. Do different CO2 reduction methods under different state plan approaches necessitate different timelines for achievement of emission reductions?**

It is very likely that different types of approaches will require different compliance timelines.

- h. What issues arise from the fact that operation and planning of the electricity system is often regional, but CAA section 111(d) calls for state plans? How should interstate issues be addressed, where actions in one state may affect EGU emissions in another state? For example, where actions have interstate impacts, which state would receive credit for the emission reduction in its state plan? Could EPA provide for coordinated submittal of state plans that demonstrate performance on a regional basis?**

This question implies a standard based on operations that exist outside the fence line. Section 111(d) only provides for the emission reductions that are realized when controlling a specific emissions source and no more.

4. What can EPA do to facilitate state plan development and implementation?

The most helpful action EPA could take would be to allow more time for the development and adoption of the plan. States need at least 18 months, though 24 months would be ideal. This would allow 6-9 months for plan design, then 15-18 months for rule adoption to support the plan. Most states have rule processes that take approximately one year, and many states like North Carolina also have a legislative review as well.

a. What types and amount of guidance and implementation support should be provided to states?

North Carolina does not believe Section 111(d) authorizes the inclusion of operations outside the fence line. In the theoretical instance where a state chooses to go beyond the fence line to show compliance with an existing source standard tools may be needed to help with quantification of some compliance measures such as end-use efficiency initiatives.

b. Are there benefits for coordination among neighboring states in the development and submittal of state plans? Should EPA facilitate the coordination of multi-state plan submittals?

North Carolina does not believe it is necessary for EPA to facilitate coordination of multi-state plan submittals. The states have experience working on plans together, such as regional haze and multi-state nonattainment area plans.

c. Would certain types of measures that might be included in state plans increase the need for coordination among states?

A variety of measures could require coordination among states depending on the nature of the state plans and how the measures will be used to determine compliance with the performance standards.

d. Are there model rules that EPA could develop that would assist states, and what would those rules cover?

North Carolina does not believe that development of model rules is necessary, since states are all in very different situations, and there will likely be a diverse set of state plans developed.

Table 1

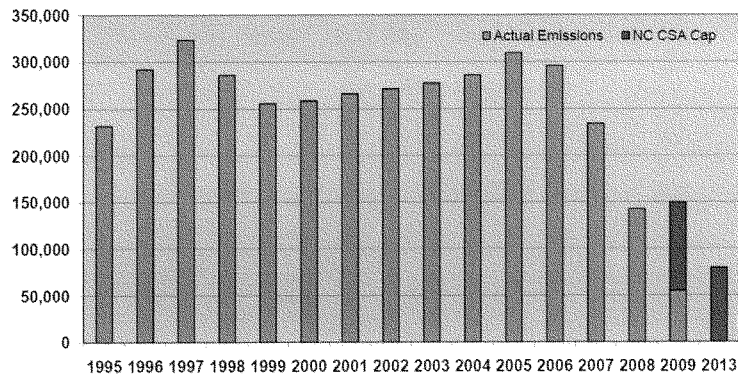
Utility	Unit & Plant Name	Location	Summer Capacity (MW)	Fuel Type	Retirement Date
DEP	Cape Fear 1	Moncure, NC	11	Steam Turbine	3/31/2011
DEP	Cape Fear 2	Moncure, NC	7	Steam Turbine	3/31/2011
DEC	Buck 3	Salisbury, N.C.	75	Coal	5/15/2011
DEC	Buck 4	Salisbury, N.C.	38	Coal	5/15/2011
DEP	Weatherspoon 1	Lumberton, NC	48	Coal	9/30/2011
DEP	Weatherspoon 2	Lumberton, NC	48	Coal	9/30/2011
DEP	Weatherspoon 3	Lumberton, NC	74	Coal	9/30/2011
DEC	Cliffside 1	Cliffside, N.C.	38	Coal	10/1/2011
DEC	Cliffside 2	Cliffside, N.C.	38	Coal	10/1/2011
DEC	Cliffside 3	Cliffside, N.C.	61	Coal	10/1/2011
DEC	Cliffside 4	Cliffside, N.C.	61	Coal	10/1/2011
DEC	Dan River 1	Eden, N.C.	67	Coal	4/1/2012
DEC	Dan River 2	Eden, N.C.	67	Coal	4/1/2012
DEC	Dan River 3	Eden, N.C.	142	Coal	4/1/2012
DEP	Lee 1	Goldshoro, NC	74	Coal	9/15/2012
DEP	Lee 2	Goldshoro, NC	68	Coal	9/15/2012
DEP	Lee 3	Goldshoro, NC	240	Coal	9/15/2012
DEP	Cape Fear 5	Moncure, NC	144	Coal	10/1/2012
DEP	Cape Fear 6	Moncure, NC	172	Coal	10/1/2012
DEP	Cape Fear 2B	Moncure, NC	11	Combustion Turbine	10/1/2012
DEP	Lee 1	Goldshoro, NC	12	Combustion Turbine	10/1/2012
DEP	Lee 2	Goldshoro, NC	21	Combustion Turbine	10/1/2012
DEP	Lee 3	Goldshoro, NC	21	Combustion Turbine	10/1/2012
DEP	Lee 4	Goldshoro, NC	21	Combustion Turbine	10/1/2012
DEP	Morehead 1	Morehead City, NC	12	Combustion Turbine	10/1/2012
DEP	Robinson 1	Hartsville, NC	177	Coal	10/1/2012
DEC	Buzzard Roost 6C	Chappels, S.C.	22	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 7C	Chappels, S.C.	22	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 8C	Chappels, S.C.	22	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 9C	Chappels, S.C.	22	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 10C	Chappels, S.C.	18	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 11C	Chappels, S.C.	18	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 12C	Chappels, S.C.	18	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 13C	Chappels, S.C.	18	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 14C	Chappels, S.C.	18	Combustion Turbine	10/1/2012
DEC	Buzzard Roost 15C	Chappels, S.C.	18	Combustion Turbine	10/1/2012
DEC	Riverbend 8C	Mt. Holly, N.C.	0	Combustion Turbine	10/1/2012
DEC	Riverbend 9C	Mt. Holly, N.C.	22	Combustion Turbine	10/1/2012
DEC	Riverbend 10C	Mt. Holly, N.C.	22	Combustion Turbine	10/1/2012
DEC	Riverbend 11C	Mt. Holly, N.C.	20	Combustion Turbine	10/1/2012
DEC	Buck 7C	Spencer, N.C.	25	Combustion Turbine	10/1/2012
DEC	Buck 8C	Spencer, N.C.	25	Combustion Turbine	10/1/2012
DEC	Buck 9C	Spencer, N.C.	12	Combustion Turbine	10/1/2012
DEC	Dan River 4C	Eden, N.C.	0	Combustion Turbine	10/1/2012
DEC	Dan River 5C	Eden, N.C.	24	Combustion Turbine	10/1/2012
DEC	Dan River 6C	Eden, N.C.	24	Combustion Turbine	10/1/2012
DEP	Cape Fear 1A	Moncure, NC	11	Combustion Turbine	3/31/2013
DEP	Cape Fear 1B	Moncure, NC	12	Combustion Turbine	3/31/2013
DEP	Cape Fear 2A	Moncure, NC	12	Combustion Turbine	3/31/2013
DEP	Robinson 1	Hartsville, NC	11	Combustion Turbine	3/31/2013
DEC	Riverbend 4	Mt. Holly, N.C.	94	Coal	4/1/2013
DEC	Riverbend 5	Mt. Holly, N.C.	94	Coal	4/1/2013
DEC	Riverbend 6	Mt. Holly, N.C.	133	Coal	4/1/2013
DEC	Riverbend 7	Mt. Holly, N.C.	133	Coal	4/1/2013
DEC	Buck 5	Spencer, N.C.	128	Coal	4/1/2013
DEC	Buck 6	Spencer, N.C.	128	Coal	4/1/2013
DEP	Sutton 1	Wilmington, NC	97	Coal	12/1/2013 (proj.)
DEP	Sutton 2	Wilmington, NC	96	Coal	12/1/2013 (proj.)
DEP	Sutton 3	Wilmington, NC	366	Coal	12/1/2013 (proj.)
DEC	Lee 3	Pelzer, S.C.	170	Coal	1/1/2015 (proj.)
DEC	Lee 1	Pelzer, S.C.	100	Coal	4/15/2015 (proj.)
DEC	Lee 2	Pelzer, S.C.	100	Coal	4/15/2015 (proj.)
Total			3797 MW		

Table 2

Utility	Unit & Plant Name	Location	Increase in Summer Capacity (MW)	Fuel Type	Date
DEP	Harris 1	New Hill, NC	8	Nuclear	2010
DEP	Harris 1	New Hill, NC	26	Nuclear	2012
DEC	McGuire 1	Huntersville, NC	29	Nuclear	2013
DEC	McGuire 2	Huntersville, NC	29	Nuclear	2013
DEC	McGuire 2	Huntersville, NC	32.5	Nuclear	2013
DEP	Robinson 2	Hartsville, SC	5	Nuclear	2013
DEP	Harris 1	New Hill, NC	4	Nuclear	2013
DEC	Catawba 1	York, SC	20	Nuclear	2014
DEC	McGuire 1	Huntersville, NC	32.5	Nuclear	2015
DEP	Brunswick 2	Southport, NC	10	Nuclear	2015
DEP	Robinson 2	Hartsville, SC	10	Nuclear	2015
DEP	Harris 1	New Hill, NC	14	Nuclear	2015
DEC	Oconee 1	Seneca, SC	15	Nuclear	2017
DEC	Oconee 2	Seneca, SC	15	Nuclear	2017
DEC	Oconee 3	Seneca, SC	15	Nuclear	2017
Total			265 MW		

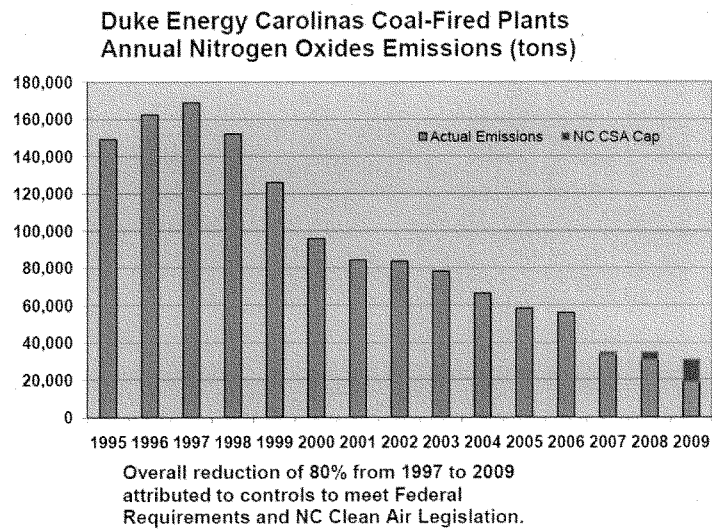


**Duke Energy Carolinas Coal-Fired Plants
Annual Sulfur Dioxide Emissions (tons)**



75 % Reduction from 2000 to 2013 attributed to scrubbers installed to meet NC Clean Air Legislation.

Source: Duke Energy 2010 IRP filing with NCUC on September 1, 2010.



Source: Duke Energy 2010 IRP filing with NCUC on September 1, 2010.

Mr. WHITFIELD. Thank you, Mr. Finley.
And, Mr. Biewald, you are recognized for 5 minutes.

STATEMENT OF BRUCE E. BIEWALD

Mr. BIEWALD. Thank you very much. Good morning, Chairman Whitfield, members of the U.S. Subcommittee on Energy and Power.

My name is Bruce Biewald. I am President and CEO of Synapse Energy Economics. We are a research and consulting firm specializing in electricity, energy, economic, environmental topics. We do work largely in the States before commissions such as North Carolina related to utility planning.

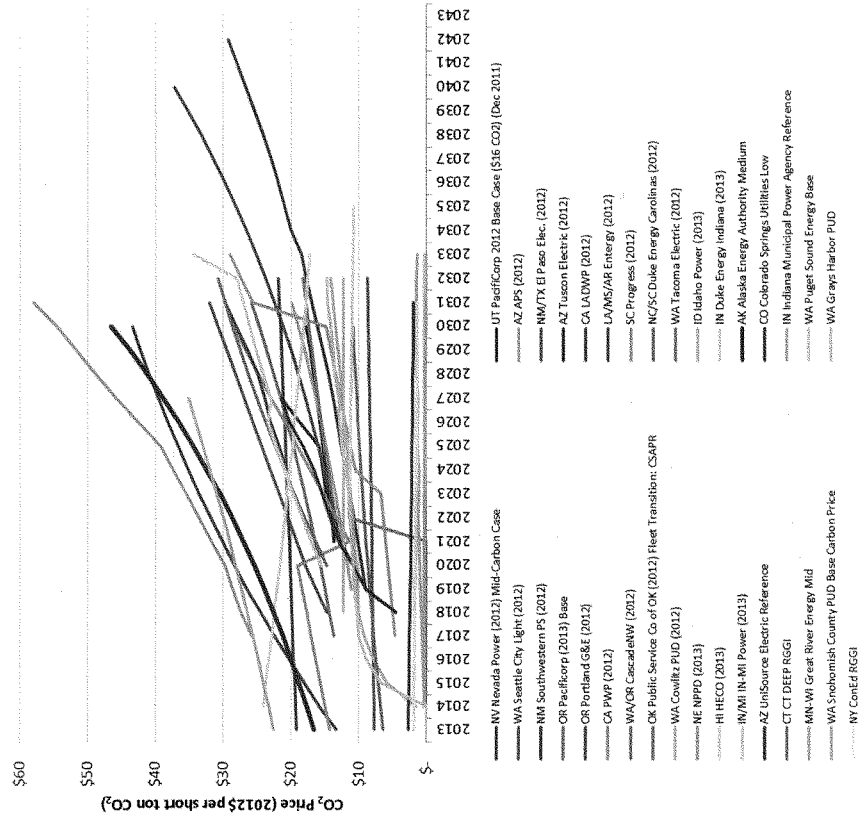
So I believe that climate change and carbon emissions from the electric sector can be addressed in the U.S. without threatening reliability, without large electricity price bill increases to customers, and in a way that creates net jobs in our economy.

I am here today to focus in particular on the planning practices in the States. Many utilities are placing dollar values on CO₂. Carbon dioxide emissions are priced in utility planning processes in the States. It has become increasingly commonplace. So that is what I am focused on.

I did a report in November 2013, which is online. I think it is actually attached to my comments here. And it reviews Federal and State policies related to CO₂ and then summarizes utility forecast of CO₂ prices. So electric utilities, they are making very important resource decisions, very capital-intensive, long-lived resource decisions, and as part of that, they present the basis for those decisions before regulatory commissions in the States. They forecast CO₂ prices, they forecast fossil fuel prices, they forecast capital costs for their resource alternatives.

So I have a slide here today. Unfortunately, it is difficult to see at this scale, but it summarizes 30-some forecasts of CO₂ prices by utilities.

[The information follows:]



Mr. BIEWALD. So we have got, for example, Duke Energy in the Carolinas as a forecast I think in the middle of the pack. There we have got Entergy in Arkansas. In their planning they use four CO₂ price forecasts—well, they use zero for certain cases. They also look at a price of \$25 per ton in 2017 in one of the sets of scenarios that they look at. So Entergy has a carbon price in their forecasts. In Arkansas, the Electric Cooperative Corporation has a CO₂ price. They look at \$0, \$10, and \$20 for purposes of the latest plan.

So, you know, utilities around the country, including what are represented here through their regulators or executives, are forecasting CO₂ prices and planning on that basis. They are able to do this and the average of the prices shown there for 2025 is \$16 per short ton of CO₂. So that is kind of a summary of a lot of complicated information.

The links to all the IRPs are provided in the appendix to my written submission here.

So I want to say that there are carbon prices I think coming in the future in the United States that affect power plants. Utilities are recognizing that. They are able to recognize that and plan to serve their customers reliably at reasonable cost and, you know, to the benefit of the local and U.S. total economies.

Energy efficiency is available. Utilities that are investing in energy efficiency are seeing prices of 2 to 4 cents per kilowatt hour. It is extremely attractive. In much of the country, particularly the middle from the Dakotas down to Texas, wind energy last year was coming in at prices of 2 to 4 cents per kilowatt hour.

In contrast, natural gas generation, you know, all in is, you know, 6 to 8 cents per kilowatt hour and the coal-fired power plants that we have been discussing, whether they are new coal-fired—well, existing coal-fired power plants with the upgrades that are required are at prices significantly above that typically. It varies by region; it varies by plant. It is important for utilities and regulators and others to roll up their sleeves, look at the details, and make sound long-term planning decisions.

Thank you very much.

[The prepared statement of Mr. Biewald follows:]

Written Statement of Bruce E. Biewald

U.S. Subcommittee on Energy and Power hearing:
“Benefits of and Challenges to Energy Access in the 21st Century: Electricity”

Thursday, February 27, 2014

Summary of Major Points

- Electric utilities make important resource decisions involving a great deal of capital investment. The long lifetimes of these assets—often 50 years or more for conventional power plants—create the need for good planning based on reasonable projections of future prices.
- Environmental regulations—including policies related to carbon dioxide (CO₂) prices—and fuel prices are two important drivers for electric utility planning.
- It is feasible to estimate future prices for both CO₂ and fuels used in electric generation:
 - Fuel prices are routinely projected and relied on in every utility integrated resource plan (IRP), despite well-known uncertainties and considerable volatility in the recent past.
 - The practice of placing a monetary value on the impacts of CO₂ emissions has become increasingly commonplace in the United States. Utilities can and do project future CO₂ prices, even though they are uncertain.
- My colleagues and I reviewed 88 IRPs released by U.S. utilities in 2012 or later. Of these, 38 IRPs from 33 utilities used non-zero CO₂ prices in the computer modeling used to determine the best generation and transmission investment decisions for the next few decades. The non-zero, public reference case price forecasts for 2025 average \$16.11 per short ton of CO₂ in 2012 dollars.

Written Statement

Good morning members of the U.S. Subcommittee on Energy and Power. My name is Bruce Biewald. I am the President and CEO of Synapse Energy Economics, a research and consulting firm specializing in energy, economic, and environmental topics.¹ The practice of placing a monetary value on the impacts of carbon dioxide (CO₂) emissions has become increasingly commonplace in the United States. My testimony focuses on the use of a “CO₂ price” in the electricity sector. Written together with several colleagues at Synapse Energy Economics, my November 2013 report, *2013 Carbon Dioxide Price Forecast*, reviews U.S. federal and state policies related to CO₂ pricing, recent modeling efforts used to determine an appropriate price level, and real-world CO₂ price forecasts used in the U.S. electric sector today.² I have included this report as a supplement to my written statement.

Electric utilities make important resource decisions involving a great deal of capital investment. The long lifetimes of these assets create a need for good planning based on reasonable projections of future prices. Many utilities must comply with state Integrated Resource Planning (IRP) requirements.³ Utilities project CO₂ and fossil fuel prices for future years in order to plan for the best resource investment decisions in their IRPs.

The *2013 Carbon Dioxide Price Forecast* reviews CO₂ price forecasts from the most recent IRPs of 28 utilities. For the purposes of this testimony, we have expanded this review. My colleagues and I reviewed 88 IRPs released by U.S. utilities in 2012 or later. Of these, 38 IRPs from 33 utilities used non-

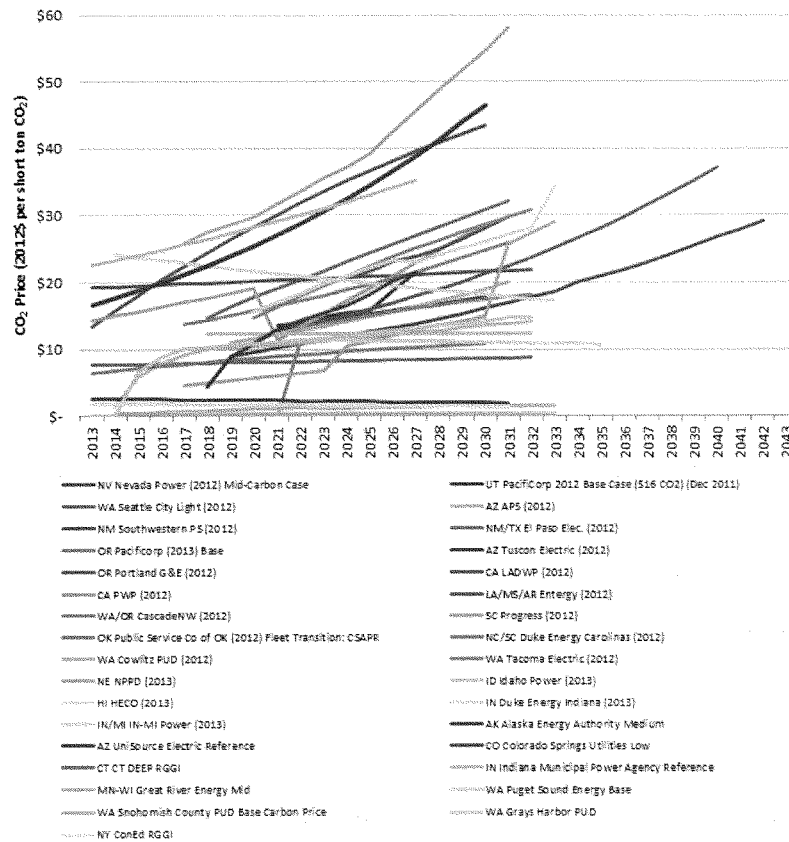
¹ Synapse’s staff of 30 includes experts in energy and environmental economics, resource planning, electricity dispatch and economic modeling, energy efficiency, renewable energy, transmission and distribution, rate design and cost allocation, risk management, cost-benefit analysis, environmental compliance, climate science, and both regulated and competitive electricity and natural gas markets. Our clients include public utility commissions in U.S. states and Canada, offices of consumer advocates, attorneys general, environmental organizations, foundations, governmental associations, public interest groups, and federal clients such as the U.S. Environmental Protection Agency and the Department of Justice. Synapse is located in Cambridge, MA. To be clear, I am not testifying on behalf of any Synapse client.

² Luckow, P., E. A. Stanton, B. Biewald, J. Fisher, F. Ackerman, and E. Hausman. November 2013. *2013 Carbon Dioxide Price Forecast*. Synapse Energy Economics.

³ For more information on state IRP best practices, see: Wilson, R. and B. Biewald. June 2013. *Best Practices in Electric Utility Integrated Resource Planning*. Synapse Energy Economics. Prepared for the Regulatory Assistance Project.

zero CO₂ prices in the computer modeling used to determine the best generation and transmission investment decisions for the next few decades. The “reference case” (also called the central, base case, or business-as-usual case) emissions forecasts used in these utilities’ IRPs are shown in Figure 1.

Figure 1. 2012 and 2013 electric utility IRP CO₂ price forecasts: reference cases (2012\$ per short ton CO₂)



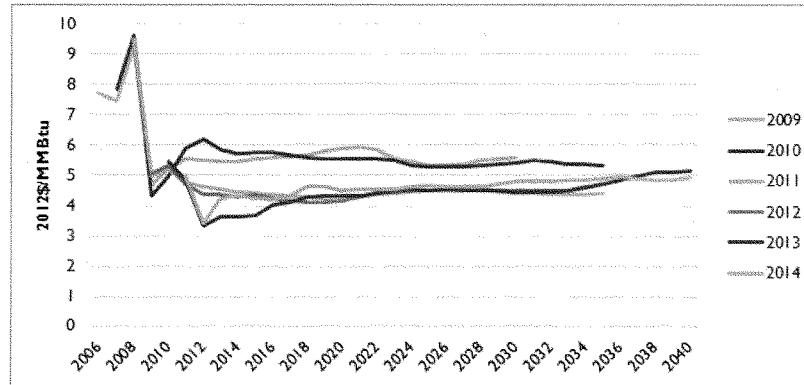
Source: See list of references below

The non-zero, public reference cases that provide a price forecast for 2025 range average \$16.11 per short ton of CO₂ in 2012 dollars.

Utilities can and do project future CO₂ prices, even though they are uncertain. Similarly, utilities project future fuel prices even though they are uncertain. The Energy Information Administration's (EIA's) *Annual Energy Outlook* projects natural gas and other fuel prices approximately 30 years into the future, despite well-known uncertainties and considerable volatility in the recent past. All utilities that develop IRPs use EIA or other fuel price projections in their modeling and planning.

As depicted in Figure 2, there has been a substantial drop (approximately 20 percent) in EIA's natural gas price projections from the 2009 and 2010 forecast vintages to the projections published in 2011 through 2014.

Figure 2. EIA natural gas price projections in 2012 dollars per million Btu



Source: Energy Information Administration, *Annual Energy Outlook* (2009, 2010, 2011, 2012, 2013, and Early Release 2014)

Since 2011, EIA has projected that natural gas prices will remain relatively stable through 2040 at roughly \$4.50 per million Btu (in 2012 dollars). At this price, natural gas is expected to be the marginal (price-setting) electric resource for much of the time in most U.S. regions, and stable electricity prices are expected.

Environmental regulations—including policies related to CO₂ prices—and fuel prices are two important drivers for electric utility planning. It is feasible to estimate future prices for both CO₂ and fuels used in electric generation. Fuel prices are routinely projected and relied on in every utility IRP.

List of References for Figure 1

IRP Label in Figure 1	Utility/Entity	Year of IRP	Source materials available at:
AK Alaska Energy Authority Medium	Alaska Energy Authority	2012	http://www.akenergyauthority.org/southeastIRP.html
AZ APS (2012)	APS	2012	http://www.aps.com/library/resource%20alt/2012ResourcePlan.pdf
WA/OR CascadeNW (2012)	CascadeNW	2012	http://www.wutc.wa.gov/rms2.nsf/177d98baa5918c7388256a550064a61e/bf967822d7e1b4b688257ad7005e339b!OpenDocument
CO Colorado Springs Utilities Low	Colorado Springs Utilities	2012	https://www.csu.org/CSUDocuments/eirp.pdf
NY ConEd RGGI	Consolidated Edison	2012	http://www.coned.com/publicissues/PDF/Integrated%20Long-range%20Plan.pdf
WA Cowlitz PUD (2012)	Cowlitz PUD	2012	http://www.cowlitzpud.org/pdf/2012%20Cowlitz%20PUD%20IRP%20FINAL%20SUBMITTED.PDF
CT CT DEEP RGGI	CT DEEP	2012	http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/cb827b1ffa58b2fd85257a1d0060c374?OpenDocument
CONFIDENTIAL	Dominion	2013	https://www.dom.com/about/pdf/irp/va-irp-2013.pdf
NC/SC Duke Energy Carolinas (2012)	Duke	2013	http://www.energy.sc.gov/files/view/Duke_IRP2012.pdf
NM/TX El Paso Elec. (2012)	El Paso Elec	2012	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCKQFIAA&url=http%3A%2F%2Fwww.epelectric.com%2Fdocument%2Fintegrated-resource-plan-2012-2031-7-16-12&ei=h5MCU4KdKKP0QH48iDoAg&usg=AFQjCNGrWSXGNfgHMuM2knj8JKM3az4_LA&sig2=k7GImNw8CpsloIAMNGvCFA&bv

			m=61535280.d.dmQ
LA/MS/AR Entergy (2012)	Entergy	2012	http://entergy-arkansas.com/content/transition_plan/2012_IRP_Filing_103112.pdf
WA Grays Harbor PUD	Grays Harbor PUD	2012	https://ghpud.org/index.php?option=com_docman&task=doc_download&gid=175&Itemid=179
MN-WI Great River Energy Mid	Great River Energy	2012	http://www.greatriverenergy.com/makingelectricity/resourceplan/pdoc295631.pdf
HI HECO (2013)	HECO	2013	http://www.hawaiianelectric.com/vcmcontent/IntegratedResource/IRP/PDF/IRP-2013-Report-Filed.pdf
ID Idaho Power (2013)	Idaho Power	2013	https://www.idahopower.com/pdfs/AboutUs/PlanningForFuture/irp/2013/2013IRP.pdf
IN Indiana Municipal Power Agency Reference	IN Municipal Power Agency	2013	http://www.in.gov/iurc/files/2013_Indiana_Municipal_Power_Agency_(IMPA)_-_IRP_Report.pdf
IN/MI IN-MI Power (2013)	IN-MI Power (AEP)	2013	https://www.indianamichiganpower.com/info/projects/IntegratedResourcePlan/
CA LADWP (2012)	LADWP	2012	https://www.ladwp.com/ladwp/faces/wcnav_externalId/a-p-doc;jsessionid=WMYSS9YYGgHPsL3bB4cqTVhyCL63sN5b64p69dWVfdJK8pXCnQ11849933180?_adf.ctrl-state=s9dhm2br9_4&_afLoop=501163834622451&_afWindowMode=0&_afWindowId=null#%40%3F_afWindowId%3Dnull%26_afLoop%3D501163834622451%26_afWindowMode%3D0%26_adf.ctrl-state%3D36wezhiZe_4
CONFIDENTIAL	Northern Indiana Public Service Company	2012	http://www.in.gov/iurc/files/NIPSCO_IRP_Revised-Redacted_1-24-12(1).pdf
NE NPPD (2013)	NPPD	2013	http://www.nppd.com/assets/2013irp.pdf
NV Nevada Power (2012) Mid-Carbon Case	NV Energy	2012	https://www.nvenergy.com/company/rates/filings/IRP/NPC_IRP/index.cfm
UT PacifiCorp 2012 Base Case (\$16 CO2) (Dec 2011)/OR PacifiCorp (2013)	Pacificorp	2012/2013	http://www.pacificorp.com/es/irp/pip.html

Base			
OR Portland G&E (2012)	Portland G&E	2013	http://www.portlandgeneral.com/our_company/energy_strategy/resource_planning/irp.aspx#2013irp
SC Progres (2012)	Progress Carolinas	2012	http://www.energy.sc.gov/files/view/ProgressEnergyResource%20Plan2012.pdf
OK Public Service Co of OK (2012) Fleet Transition: CSAPR	Public Service Co. of OK	2012	http://occeweb.com/pu/PSO%202012%20IRP.pdf
WA Puget Sound Energy Base	Puget Sound Energy	2013	http://pse.com/aboutpse/EnergySupply/Pages/Resource-Planning.aspx
CA PWP (2012)	PWP	2012	http://ww2.cityofpasadena.net/waterandpower/irp/
WA Seattle City Light (2012)	Seattle City Light	2012	https://www.seattle.gov/light/news/issues/irp/docs/SCL_2012_IRP.pdf
WA Snohomish County PUD Base Carbon Price	Snohomish County PUD	2013	http://www.snopud.com/Site/Content/Documents/custpubs/IRPfinal_012114.pdf
NM Southwestern PS (2012)	Southwestern PS (Xcel)	2012	http://www.xcelenergy.com/About_Us/Rates_&_Regulations/Resource_Plans/SPS_Integrated_Resource_Plan_2013-2032
WA Tacoma Electric (2012)	Tacoma Electric	2012	http://www.mytpu.org/files/library/2012-irp.pdf
AZ Tuscon Electric (2012)	Tuscon Electric	2012	http://files.shareholder.com/downloads/UNIS/2951310529x0x557199/806B57DB-06CF-4E46-BB16-124E53DCAC74/2012_TEP_IRP_1.pdf
AZ UniSource Electric Reference	UNS Electric, Inc	2012	http://files.shareholder.com/downloads/UNIS/2951310529x0x581799/A94A5E83-D73F-42F9-BDAA-F8685EF134F1/UNSE_2012_IRP_Final_Version_04-02-2012_.pdf

The report "2013 Carbon Dioxide Price Forecast" is available at <http://www.synadpse-energy.com/Downloads/SynapseReport.2013-11.0.2013-Carbon-Forecast.13-098.pf>.

Mr. WHITFIELD. Thank you very much.

Mr. Coleman, you are recognized for 5 minutes.

STATEMENT OF MEL COLEMAN

Mr. COLEMAN. Thank you, Mr. Chairman.

Members of the Energy and Power Subcommittee, thank you for inviting me to testify today on the benefits and challenges to electric energy access in the 21st century. I am Mel Coleman. I am here only as CEO of North Arkansas Electric Cooperative and my main concern are my 35,000 accounts that I have.

We strive each and every day to improve the quality of life. That is the business we are in. We have 28,000 members, 35,000 connects. We purchase our power from Arkansas Electric Cooperative Corporation, which is our cooperatively owned wholesale power supplier.

We have an obligation, Mr. Chairman, to provide a reliable supply of electricity, plain and simply, providing that to our member consumers at the lowest possible price. This job is not easy today based on the new and ongoing challenges that we face. One such challenge is the heavy infrastructure investment that is associated with serving rural service territories. Co-ops serve very diverse communities with sharp economic and geographical differences with service territories that are sparsely populated. I have a density, sir, of 7.4 meters per mile where the average across the United States is 33.3. So our costs are a lot more than most co-ops and most utilities will see. The legacy of rural electrification and the obligation to serve the last mile results in higher maintenance costs as compared to our industry counterparts.

On top of our infrastructure challenge, we serve some of the neediest Arkansans. As with most rural areas, North Arkansas is economically depressed with limited economic opportunities for our members. All six counties that my co-op serves has an average poverty rate of 19.15 percent, well above the national average, and a median household income of \$32,000, well below the national average. Rural consumers are more dependent upon electricity to meet their household energy needs than those living in urban and suburban households. Contributing factors are higher electric usage in rural areas and the prevalence of single-family detached unit homes, as well as energy inefficient manufactured housing. So it stands to reason that increased electricity costs have a disproportionate impact on rural consumers.

Recently, consumers have been hit with the double whammy of increased costs and higher rates due to the recent cold snap. Not even a southern State like Arkansas was immune. Our electric co-ops set new peaks for winter power consumption with this being the coldest winter the State has experienced in 20 years. High demand for electricity and natural gas, along with localized gas supply disruptions, force the grid to rely heavily on coal generation to meet the power needs this winter.

I hope we can all take a lesson from these events and appreciate the stability of coal pricing as a hedge against natural gas-priced

volatility. Our coal-based generation resources protected Arkansas' electric cooperative member consumers from the full effect of the recent spike in natural gas prices. This winter proves that such a move to shut down coal plants and EPA's goal of shutting down coal plants would jeopardize reliable and affordable electricity for my members.

Unfortunately, EPA's proposed standard to limit carbon dioxide emissions from new coal units will require carbon dioxide capture technology that is costly and is not viable on a commercial scale, effectively removing new coal generation as a hedge against future natural gas price spikes. EPA's climate regulations may well be the greatest threat facing our industry. We are extremely concerned that EPA will propose a standard to existing coal plants this summer that will threaten the viability of our existing coal fleet, resulting in increased cost to our members and undermine the reliability of the Nation's power grid.

My cooperative, members of the committee, is not in the electric business. We are in the life improvement business. Our partnership with NRECA's international program has only confirmed my sentiments about our commitment to quality of life. To see what rural America was like before rural electrification, all you need to do is visit a Third World country.

I hear old-timers talk about the day the lights came on but I didn't experience that day. I was fortunate to be part of an electrification project in the remote areas of northwest Guatemala. Last year, I saw the lights come on for the first time for people. As the electrons flowed for the first time, so did the tears of all who witnessed. That was the beginning of the quality of life for those villagers, and in their face, I saw our grandparents and felt what they experienced in our country 75 years ago. That is what we have to protect. Electricity is the foundation of our quality of life, and we must never forget that. Thank you.

[The prepared statement of Mr. Coleman follows:]

Testimony of Mr. Mel Coleman

**Chief Executive Officer, North Arkansas Electric Cooperative
Vice President, National Rural Electric Cooperative Association
Board of Directors**

**To the Committee on Energy and Commerce
Subcommittee on Energy and Power**

U.S. House of Representatives

Thursday, February 27, 2014

Introduction

Chairman Whitfield, Ranking Member Rush, members of the Energy & Power Subcommittee, thank you for inviting me to testify on the benefits and challenges to electric energy access in the 21st Century. My name is Mel Coleman, and I am CEO of North Arkansas Electric Cooperative (NAEC). I also have the privilege of serving as Vice President of the Board of Directors for the National Rural Electric Cooperative Association (NRECA), and my testimony today will reflect the views of both NAEC and NRECA.

NRECA is the national service organization dedicated to representing the national interests of cooperative electric utilities and the consumers they serve, including more than 900 not-for-profit rural electric utilities that provide electric energy to over 42 million people in 47 states. NRECA's members include approximately 67 generation and transmission ("G&T") cooperatives, which generate and transmit power to 668 of the 838 distribution cooperatives in NRECA. The G&Ts are owned by the distribution cooperatives they serve. Remaining distribution cooperatives receive power directly from other generation sources within the electric utility sector. Both distribution and G&T cooperatives were formed to provide reliable electric service to their owner-members at the lowest possible cost. NRECA member cooperatives serve 19 million businesses, homes, schools, churches, farms, irrigation systems, and other establishments while employing approximately 70,000 people in the United States.

I have had the good fortune of serving the members of NAEC for more than 25 years. NAEC is one of seventeen distribution cooperatives in the state of Arkansas. As a member-owned electric cooperative, we serve more than 36,000 accounts in Northern Arkansas covering six counties. Our cooperative energized its first line in 1940 and has since grown to over 4,800 miles of distribution lines. With a density of 7.41 members per mile of line, our cooperative strives each and every day to improve the quality of life of the 28,000 plus members we serve. With three retirement communities located within our service area, a majority of our members are 60 years of age and older, most living on a fixed income. At NAEC we have a commitment to our members to keep the lights on and rates affordable. Currently the state of Arkansas has an average kWh rate of \$0.0943. In comparison, North Arkansas Electric Cooperative's rate per kWh is \$0.10148. Our commitment to our members is evidenced through recent member satisfaction surveys with an average satisfaction rate of 89 percent.

North Arkansas Electric Cooperative purchases its power from Arkansas Electric Cooperative Corporation (AECC) located in Little Rock, Arkansas. Created in 1949, AECC provides power for more than 500,000 farms, homes and businesses in Arkansas. AECC relies on a diverse generation mix. Of the twelve generating stations that AECC owns or is part owner in, coal is their primary generation fuel followed closely by natural gas. NAEC is a part owner of AECC. According to projections by AECC, EPA mandated environmental coal plant upgrades will cost \$614 million dollars, where the total plant cost was only \$1.17 billion dollars. These costs will be paid by my members, and the rest of the cooperative members in Arkansas.

Barriers to Providing Affordable/Dependable Electricity

At North Arkansas Electric Cooperative, we have an obligation to provide a reliable supply of electricity to our member-consumers at the lowest possible price. We take this obligation to serve very seriously because the personal and economic health of our members and communities depend on it, but this job has not gotten any easier due to new and on-going challenges facing our industry. One such challenge is the heavy infrastructure investment associated with serving in rural service territories. Nationally, electric cooperatives provide service in 2,500 of all 3,141 counties in the United States. Electric cooperatives own and maintain 2.5 million miles (42 percent) of the nation's electric distribution lines, covering 75 percent of the U.S. landmass, while serving just 12 percent of the nation's electric customers.

Co-ops serve diverse communities with sharp economic and geographical differences with service territories that are sparsely populated. NAEC's low density, 7.4 consumers per mile of line, is dramatically lower than the national average of 33.3, resulting in cost implications for our members. Co-ops collect average annual revenue of approximately \$15,000 per mile of line, compared to annual revenue of \$75,500 per mile of line for investor-owned utilities and \$113,000 per mile of line for municipal electrics. NAEC's system covers vast expanses of remote and often rugged topography, presenting unique economic and engineering challenges requiring significant amounts of capital and an unrelenting commitment to system reliability. The legacy of rural electrification and the obligation to serve the "last mile" results in higher maintenance costs as compared to our industry counterparts.

On top of our infrastructure challenges, NAEC serves some of the neediest Arkansans. As with most rural areas, Northern Arkansas is economically depressed with limited economic opportunity for our members. All six counties served by NAEC have an average poverty rate of 19.15 percent and an average median income of \$32,250, compared to the national average of 15 percent and \$51,017 respectively. NRECA member cooperatives serve a large percentage of our nation's "persistent poverty counties" with poverty rates 20 percent or above for the past three decades.

Rural electrification is one of the most successful efforts in our nation's history of tackling poverty and raising standards of living. However, despite great progress through the efforts of many, co-op service territories are still lagging in many economic indicators. Rural consumers are more dependent on electricity to meet their household energy needs than those living in urban and suburban households due in part to limited access to natural gas. The average electricity rate of usage for co-op served households is 1,128 kW a month, significantly higher than the investor-owned average of 829 kW and the muni average of 971 kW. Another factor contributing to household electric usage being higher in more rural areas is due to the prevalence of detached single unit homes as well as energy inefficient manufactured housing. At 14.7 percent, the share of mobile homes in the housing stock of co-op territories is more than double the U.S. average of 6.5 percent. So it stands to reason that increased electricity costs have a disproportionate impact on rural consumers. Given the high cost of propane and heating oil, rural households often lack alternatives when electric rates rise sharply.

Recently, consumers have been hit with the double whammy of increased costs and higher rates of usage due to the recent cold snap. Not even a southern state like Arkansas was

immune. Arkansas' electric cooperatives set new peaks for winter power consumption with this being the coldest winter the state of Arkansas has experienced in 20 years. The Energy Information Agency (EIA) recently attributed the increased electricity prices to the cold weather which has produced spikes in natural gas use and prices. Natural gas spot prices averaged \$4.71 per million Btu in January, an increase of \$0.47 per million Btu since December. High demand for electricity and natural gas along with localized gas supply disruptions forced the grid to rely heavily on coal generation to meet power needs this winter. Interestingly, natural gas prices rose to a level that incentivized bringing on unused coal capacity to help back out natural gas demand. As we have all seen first-hand this winter, natural gas prices are volatile and can spike even during short term weather events with a direct impact on electric bills. I hope we can all take a lesson from these events to appreciate the stability of coal pricing as a hedge against natural gas price volatility. The severity of the recent winter weather brings into focus another significant challenge facing our industry: the challenge of providing an abundant and growing supply of affordable electricity adequate to meet the peaks of the winter heating season.

In Arkansas, when it comes to providing electricity, we like to say "the mix matters," which is to say we believe the smart solution to providing the power is to do right by our members and the environment by using a balanced mix of generation resources. AECC utilizes wind, hydro, biomass, solar, natural gas and the cleanest coal technology available to power communities throughout the state. AECC's coal based generation resources protected electric cooperative member-consumers from the full effect of the recent spike in natural gas prices. AECC dispatches coal units as much as possible because they provide member-consumers a lower price than gas. Although it would seem that EPA's goal is to shutdown coal plants, this winter proves that such a move would jeopardize reliable and affordable electricity for Arkansas. Unfortunately, EPA's proposed standard to limit carbon dioxide emissions from new coal units will require carbon dioxide capture technology that is costly and not viable on a commercial scale, effectively removing new coal generation as a hedge against future natural gas price spikes.

I would add that AECC owns a portion of the cleanest and most efficient coal plant in the United States, the John W. Turk, Jr. Power Plant, the only U.S. plant in operation using advanced ultra-supercritical technology. In August 2013, POWER magazine named the Turk Plant as its Plant of the Year; a distinction presented to the industry leader in the deployment of advanced technology and maximized efficiency while minimizing environmental impact. How unfortunate is it that, while China will continue to deploy ultra-supercritical technology, the EPA's new unit rule will effectively prohibit the construction of this highly efficient and environmentally advanced technology here at home. EPA's climate regulations may well be the greatest threat facing our industry. We are extremely concerned that EPA will propose a standard to existing coal units this summer that will threaten the viability of our existing coal fleet, result in increased costs to our members and undermine the reliability of the nation's power grid.

In the development of national energy policy, public-private partnerships and incentives are much more beneficial for all concerned rather than mandates and regulations. We support an "all-of-the-above" electric generation approach to ensuring electric cooperatives have the resources they need to meet future electricity demand. Advanced nuclear, carbon capture and

storage technologies and renewable resources require federal incentives and financial support in order to encourage their development and help bring down their costs to consumers. Such incentives must be provided on an equitable basis to not-for-profit electric cooperatives, just as they are provided to for-profit utilities.

The Powerplant and Industrial Fuel Use Act was passed in 1978 in response to concerns over national energy security. The Fuel Use Act required all new electric generating facilities to be "coal capable." Due to the capital cost differentials between facilities constructed to be coal capable compared to those designed solely for natural gas use, and the significantly higher fuel costs associated with using natural gas as compared to coal, the Fuel Use Act prohibited new electric generating units that were coal capable from using natural gas as the primary fuel. The Act was repealed in 1987, but during the time the Fuel Use Act was in effect, electric cooperative generation needs grew substantially. As a consequence, about 60 percent of cooperative total baseload electric generation was constructed under the Act and is coal based.

Now roughly 30 years later, the phrase "everything is cyclical" is evidenced in the administration's push toward natural gas and renewable generation and away from coal fired generation. Why push our economy away from an economical choice in fuel generation such as coal? Renewable electric generation definitely has a place in the fuel mix, however the technology does not exist today for these renewables to be utilized as base load generation. Additionally, the dependability of these fuels is not adequate to meet load requirements during times of exceedingly hot or cold weather. Common sense says there must be a balance and we need the cooperation of federal policymakers to help cultivate a diverse and sensible fuel mix.

Yet another barrier to providing affordable electricity is our dear friend Mother Nature. We all know the devastating impact that weather can have on the electric distribution system. In 2009, NAEC experienced a monumental ice storm that destroyed over 5000 poles, and 20 percent of our total distribution system. At one point, all 36,000 of our accounts were without electricity. Some of my members had to exist without power for 19 days. To say we take electricity for granted is an understatement. If you truly think about how much of our lives revolve around the single flip of light switch or the simplicity of an electrical outlet, you realize how vital electricity is to our quality of life. And we must be able to deliver it reliably and affordably.

Benefits of Reliable/Affordable Electricity in Rural Areas

Cooperatives like North Arkansas Electric Cooperative have always emphasized electric energy conservation to their members. NAEC is one of the first cooperatives in the nation to utilize the Rural Utilities Services Energy Resource Conservation Loan program to our members for home efficiency upgrades. We offer low interest financing on high efficiency geothermal heat pumps, insulation, energy efficient windows, and other measures that save electric energy.....and save our members real dollars. Our small cooperative has loaned in excess of \$15 million dollars since the late 80's for residential energy efficiency improvements. We educate our members on energy efficiency and conservation, and offer free energy audits to all we serve. All this is part of our efforts to be good stewards of the electric energy resources we have. Every kilowatt-hour we help a member to 'not use', is a kilowatt-hour of generation that doesn't have

to be constructed. That also improves the quality of life for our members by helping them keep more of their hard earned dollars.

As electric cooperatives our purpose is to power communities and empower members to improve the quality of their lives. All aspects of modern society — including the business sector, benefit from abundant, highly-reliable, inexpensive, and secure electricity — which is the very foundation of modern society. Make no mistake....the very foundation. Everyone benefits when people of every economic level can access electricity whenever they wish. By having a sound, reliable distribution system with affordable rates, electric cooperatives are more competitive in recruiting industry to their area, which in turns leads to more jobs and lower unemployment. Improved economic opportunities have a direct impact on the financial stability of all utilities and service companies, as citizens are able to pay their financial commitments on time, lowering write-off rates for businesses.

The most distinctive difference that sets electric cooperatives apart is not the products and services we offer, but how the electric cooperative “bottom line” differs from that of investor-owned utilities. Our “bottom line” is the empowerment of our member-owners. I get up every day, not concerned in the least about profits or stock prices. My only concern is for my members, their families, and their quality of life.

Many Americans feel that they are increasingly on their own, with few trusted institutions to help them ensure a better life for themselves and their families. There is a yearning for organizations that people can trust and with which they can identify. Institutions like electric cooperatives are as necessary today as they were when they were created

Conclusion

The sole benefit of access to electric energy is quality of life. And the sole beneficiaries are my member-owners. My cooperative is not in the electric business....we are in the life improvement business. We work with and live with the members we serve. Those that own the cooperative. We must make sure that their lights stay on un-interrupted, and that their bills are affordable. That can only be accomplished with a commitment to our communities and our members, and with an all-of-the-above electric energy fuel strategy.

The electric cooperative story is about ordinary people who banded together to improve their quality of life by bringing electricity to their communities when no one else would. One just needs to look back at the debate captured in the Congressional Record leading up to the Rural Electrification Act of 1936. I am sure some of you, like me, have read the hundreds of pages in the record. Yes it's about electricity and about fairness. Yes it's about rural farms and businesses. But, it's all about quality of life for people who were in desperate need of something better. This is the vision that President Roosevelt manifested in the people of rural America when the Act was signed. Cooperatives were formed by people going door-to-door to sign up members. Poles and wires were set by hand. Backbreaking work for and by the people.

Empowering people to improve their quality of life is not only the history of electric cooperatives, it is also our heritage — it's who we are. Quality of life is important wherever you live — in urban areas or in rural areas. Our partnership with NRECA's International Program has

only confirmed my sentiments about our commitment to quality of life. To see what rural America was like before the Rural Electrification Act, just visit a third world country. I hear old timers talk about the "day the lights came on." But I did not experience that day. I am fortunate to be a part of an electrification project in the remote areas of Northwest Guatemala. Last year I saw first-hand the day the lights came on in a village. As the electrons flowed for the first time, so did the tears of all who witnessed. That day was the beginning of a new quality of life for those villagers. In their face I saw our grandparents and felt what they experienced in our country 75 years ago. That's what we must protect.....electricity is the foundation of our quality of life and we must never forget that. We have and continue to help bring the most basic commodity of electricity to improve their quality of life.

At the end of the day when we all go to the comfort of our homes, we must be confident in knowing that we have done everything humanly possible to keep electricity flowing. And more importantly, that we keep it affordable to every single person in our great country.

Members of the committee, I thank you again for the privilege of providing this testimony.

Mr. WHITFIELD. Thanks, Mr. Coleman.
And, Mr. O'Brien, you are recognized for 5 minutes.

STATEMENT OF PAUL O'BRIEN

Mr. O'BRIEN. Thank you, Mr. Chairman, and thanks, Ranking Member McNerney, for your comments and for inviting us here.

Oxfam America is part of a collaboration of 17 affiliates, and we work in 90 countries around the world, kind of in the same business as Mr. Coleman, trying to improve lives. And those were touching reflections and we have experienced those ourselves. We see energy poverty and what it means to people on the ground all over the world where we work. I lived in Afghanistan for 5 years and I saw the same thing. I saw micro hydro dams turn on electricity for girls who were able to do schoolwork for the first time. In Sudan, I saw pumps that electricity was allowing water to come out. Women no longer had to walk through insecure areas. It literally changed their lives, may have saved them. East Africa in more remote areas I saw what refrigerated electricity can do for the medicines that rural communities and remote places can have and health clinics work all day long.

But we have seen something else happening in the last few years that we are also trying to work on on the ground, and that is the devastating impacts of climate change for poor communities. We feel that they are the ones who face it first and worst. They are 20 times more likely to face a climate disaster in their lifetimes than the non-poor.

So what has that meant for us? Well, it means two big things. One, it means that we as Oxfam have to spend a lot more time trying to help people to be food secure in an increasingly insecure environment. We work in places like Mali, Ethiopia, Nigeria, Senegal to help farmers develop resilience practices so that they can cope with unpredictable weather. We have watched in the last few years food price spikes. And of course these are far worse for poor people because they are spending 70 percent of their income on food. So corn may not be at all-time high now but it was just a couple of years ago, and our estimates and our research tells us that corn is going to double in cost in real terms over the next 20 years due to climate change.

The other big thing we see besides food insecurity is climate-related disasters. We have worked with victims of flooding in places like Pakistan and Bangladesh. We have helped communities recover from coastal incursions by extreme weather in the Gulf Coast of the United States, in Haiti, and very recently, in the Philippines.

In the next 40 years, we estimate that somewhere between 150 million and 1 billion people are going to be displaced by climate change. The U.S. is already one of the most generous and effective responders to disasters around the world, but are we going to be able to cope? Already, today, we are dealing with south Sudan, Syria, the Philippines, the Central African Republic. What are we going to do when climate exacerbates the breadth and depth of the disasters that we face? And this isn't just about the people on the ground that Oxfam America and others like us care about. It is also about all of the security and political unrest that comes when you face those kinds of disasters. What are we going to do?

Something different must be done to deal with these two challenges of energy poverty which is real on the one hand, as we have spoken about, but also of climate-related poverty. And just to be clear, Oxfam America does not oppose fossil fuel extraction. We worked for 10 years to make sure that the monies from oil, minerals, and gas that developing countries are getting, and they are getting it—goes towards poverty reduction.

I just want to put this in numerical context. Globally, there is about \$130 billion spent every year on AIDS to help people living in poverty mostly in developing countries. At the same time, there is \$2 trillion of private investment going into developing countries. And there is \$6 trillion of government investment being spent in developing countries. The question that is before us is not whether we should decide the fate of fossil fuel industries in Africa and other places. That is going to happen anyway. The question is whether we should be taking precious U.S. payer tax dollars and using it to invest in fossil fuels. And we believe that that is not the way forward if the interests of the poor in those countries is the center of the equation.

So today, the Electrify Africa Act is being marked up by the House Foreign Affairs Committee and we, Oxfam, and many organizations like us are advocating that the Act adhere to three core principles around access. First, it should be prioritizing access and not just production. Secondly, let's remember that at the end of the day whether communities and countries have viable access to electricity is going to be the responsibility of their governments, and everything we do should weaken, not undermine, those governments. Whether we like it or not, they are going to be responsible for maintenance and for ensuring that revenues are connected to sustain their energy economies.

And finally, we believe that the Act should be prioritizing renewable energy development. And just a couple quick comments on why. First, we believe that fossil fuels do not internalize the actual cost of their production, their cost to communities, their cost to countries, their cost to the planet. If they did, we believe that they are actually far more expensive than renewable energies. Secondly, we know where the poor are living, and although some will say that the numbers around urban poor are high, maybe as high as 200 million, we don't think it is that high. Even in a place like Africa, most people, 400 million, are living in rural areas where you cannot access them with centralized grid planning. You need mini-grids. You need off-grid plans.

I watched in Afghanistan in the early——

Mr. WHITFIELD. Mr. O'Brien, excuse me a minute. I have let you go over a minute and 15 seconds——

Mr. O'BRIEN. OK.

Mr. WHITFIELD [continuing]. So if you could just summarize.

Mr. O'BRIEN. I will close with one sentence. Renewable energy costs, we believe they are going down and we would like more creativity and innovation by the United States.

But thank you, Mr. Chairman——

Mr. WHITFIELD. Thank you.

Mr. O'BRIEN [continuing]. For allowing me the time, and I look forward to your questions.

[The prepared statement of Mr. O'Brien follows:]



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Raymond C. Offenheiser
 President

**Testimony of Paul O'Brien, Vice President for Policy and Campaigns, Oxfam America, to
 House Energy and Commerce Committee, Subcommittee on Energy and Power**

"Benefits of and Challenges to Energy Access in the 21st Century"

February 27, 2014
 Rayburn Office Building, Room 2123

Mr. Chairman, I want to thank you and Ranking Member Rush for this hearing on the challenges of energy access, especially for the world's poor. I appreciate the opportunity to testify before this subcommittee. This is an important moment for United States leadership in addressing our global energy future in ways that sustain and advance development goals.

Oxfam America is an international relief and development agency committed to developing lasting solutions to poverty, hunger, and social injustice. We are part of a confederation of 17 Oxfam affiliates working in more than 90 countries. Through policy engagement and advocacy, we aim to tackle the root causes of hunger and poverty, and to help people claim their rights.

Energy poverty is a major development challenge for the world's poor. Nearly 600 million people in sub-Saharan Africa live without consistent and predictable access to electricity.¹

Electricity is the key to business growth and economic development—it is what turns the lights on at night for children doing their schoolwork. When it powers a water pump, it can change or save a woman's life. It keeps drugs safely refrigerated and health clinics operating throughout the developing world.

No one really debates that energy poverty is a critical problem. But Oxfam also believes that solutions to energy poverty should foster long term opportunities and not exacerbate climate change. Global temperature rise—driven in large part through ongoing exploitation of fossil fuels—increasingly threatens the very communities who most need economic development. We believe that sound public policy can and should guide us in the direction of a cleaner energy future—one that does not intensify the challenges faced by the most vulnerable among us.

In my testimony today, I will focus my remarks on the impacts that climate change has on the poor, particularly the millions of smallholder farmers around the world with whom Oxfam works. I will close with some recommendations on how to extend first-time energy access to poor communities around the world.

1. The impacts of climate change hit the poor first and worst.

The evidence is in: growing greenhouse gas emissions from burning fossil fuels contribute to climate change and devastate vulnerable communities around the world.

In country after country, Oxfam is witnessing what is happening to communities as a result of climate change. Throughout Africa, Latin America, and East Asia, our staff and partners are already responding to the serious impacts of climate change, from increasingly severe weather events to water scarcity. We are working with farmers in Senegal, Mali, Ethiopia, and Nigeria to invest in more resilient farming practices to cope with increasingly unpredictable weather trends. We are helping farmers limit their risks with integrated risk management tools, including improved resource management and index-based insurance. We have worked with victims of flooding in Pakistan and Bangladesh. We have helped communities recover from severe storms in the Gulf Coast of the United States, Haiti, and the Philippines. All around the world, in farms and in cities, we have seen homes leveled, businesses destroyed, and livelihoods ruined.

So, in short, we agree with World Bank President Jim Yong Kim who said “If we don’t confront climate change, we won’t end poverty.”ⁱⁱⁱ

People living in developing countries are 20 times more likely to be affected by climate-related disasters—such as floods, droughts, and hurricanes—compared to those living in the industrialized world. In the 1990s alone, nearly two billion people in developing countries were affected by climate-related disasters.

The carbon footprint of the world's one billion poorest people represents just three percent of the global total. Yet as climate change advances and poor communities are hardest hit we have a responsibility to increase their access to energy in ways that avoid harm and help them adapt.

2. Climate change will increase food insecurity and hunger

As high temperature thresholds are crossed, and weather related disasters increase, crop yields are reduced and agricultural productivity declines. The lifeline of the world's poorest countries, where communities depend on agriculture for their very existence, is being frayed.

Farmers everywhere are seeing crops wiped out because of increasingly extreme and unpredictable weather. This drives dangerous food price spikes, which are already pushing the vulnerable deeper into poverty. We all feel the impacts as prices spike, but the poorest people who are least responsible for climate change are hit hardest because they often spend up to 75 percent of their income on food.

The price of staple foods such as corn, already near all-time highs, could more than double in the next 20 years. Even under a conservative scenario a US drought in 2030 could raise the price of maize by 140 per cent on top of projected long-run price rises.

Current levels of agriculture productivity will decline as extreme weather events increase, dry seasons become longer and hotter, and rainfall patterns become increasingly erratic, affecting rain-fed agriculture production. Projected impacts of climate change on crop yields, which in the tropics and subtropics could fall 10-20% by 2050, could leave an additional 25 million children undernourished by 2050 in developing countries. The long-term decline in productivity will be punctuated by catastrophic crop losses caused by extreme weather events.

3. Climate disasters threaten to overwhelm our global humanitarian system

In the next 40 years, climate-related disasters are projected to displace between 150 million and one billion people. Two billion people live in regions expected to become severely water stressed. At a time when it is getting harder and harder to raise humanitarian funding and global support—look at what is going on in Syria, the Central African Republic, South Sudan and the Philippines—climate change is increasing the likelihood of disasters and health crises.

These are just the direct impacts. Migration and refugee crises, increasing inequality and vulnerability to disasters, will only incite further instability and popular unrest as governments struggle to meet the needs of their people. The United States may be forced to address these significant threats to international stability and national security.

These are some of the reasons why we are calling for the United States to take preventive action to achieve a dramatic and immediate reduction in the greenhouse gas emissions that cause climate change.

4. The United States government has a role to play in promoting responsible energy development

The real question before this committee is *not* whether countries should have access to their own fossil fuel wealth to generate power, whether it is oil, gas or coal. Oxfam has worked for

more than a decade in countries around the world to help citizens hold their governments accountable and ensure that revenues from natural resource extraction, including fossil fuels, are spent on providing essential public services and flow to poverty reduction. Nor is the question whether people in developing countries have a right to increase their carbon footprint in order to develop. The real question for this committee is whether the United States should be incentivizing developing countries to meet their energy needs through fossil fuel extraction.

Through its development and investment policies, the United States will determine whether our efforts to address energy poverty will position us as a laggard or leader in supporting pro-poor renewable energy technologies. As a global innovator, we believe the United States government should find the win-win in this equation.

Today, the House Foreign Affairs Committee is marking up the Electrify Africa Act, an important piece of legislation which, like President Obama's Power Africa Initiative, aims to address energy poverty in Africa. With many of our NGO colleagues, Oxfam believes that this legislation should reflect key principles of responsible energy development, including:

Prioritize not just energy production but quality “access:” “Energy access” should focus on households and services such as healthcare and education in poor, rural, and marginalized communities, where access is limited. While strengthening the stability and reliability of electricity supply for industrial development connected to the centralized power grid is also important for economic growth, we should be clear that addressing energy poverty requires a tailored strategy.

Prioritize renewable energy development: In expanding energy access, legislation should prioritize clean, renewable energy sources, including off-grid and mini-grid solutions. There are several reasons this prioritization makes sense:

First, exploitation of fossil fuels carries with it long-term costs—for the climate, for human health, and often for the ecosystems, natural resources and communities from which they must be extracted. Unfortunately, these costs typically aren't recorded in the ledgers of the corporations that profit from fossil fuel development, but instead are borne by all of us.

Second, those who live without access to energy live in remote, rural communities that aren't reached by the conventional electricity grid. The International Energy Agency (IEA) has indicated that conventional grid extension is viable for urban areas and only about 30% of rural areas, leaving 70% of rural areas in need of mini-grid or off-grid solutions.ⁱⁱⁱ Renewable energy is better suited for such decentralized power needs, and in fact, in the scenario developed by the IEA for universal access to energy, 65% of that energy comes from renewable sources. In my own experience in rural Afghanistan, I saw micro hydro dams and solar initiatives appear all over the country. I saw small businesses starting and girls doing their homework at night under light-bulbs that would not have been there if we had opted for centralized power schemes.

We recognize the important role played by the Overseas Private Investment Corporation, which, thanks to their greenhouse gas reduction policy, has advanced a portfolio devoted to renewable resources that has grown dramatically in recent years, making it a development investment leader in renewable energy projects that increase energy access.

Additionally, renewable energy capital costs have plummeted in recent years and are expected to drop still further. According to a 2013 market research paper by Deutsche Bank, in South Africa solar energy for residential use is already capable of being deployed more cheaply than the current price of electricity from the grid.

Our third principal for responsible energy development is about the importance of responsible governance institutions: The promotion of energy access should also support inclusive, transparent, and accountable processes for planning, implementation, and management. Investments should ensure compliance with international best practice fiduciary standards and social and environmental safeguards, and in cases of potentially significant environmental and social impacts, communities must have the right to free, prior and informed consent to projects.

While renewable energy technologies present many advantages over fossil fuel development, we recognize that a mix of energy sources will be needed to fully address energy poverty around the world. When natural gas investment is part of the solution, its development needs to be under the same best practice economic, environmental, and social safeguard assessments to ensure clear public interest that benefits the poor.

Oxfam does not believe that we should try to solve climate change on the backs of the poor. We must support affordable, available clean energy technologies that benefit communities today and in the future. That is why we want more investment, innovation and leadership focused on

21st century solutions to our energy and climate challenges. We urge Congress to use its authority towards that end.

I thank the committee for the opportunity to share Oxfam's views and I am happy to answer questions you may have.

ⁱ IEA 2011. Energy for All: Financing Access for the Poor. P 10.

http://www.iea.org/media/weowebiste/energydevelopment/weo2011_energy_for_all.pdf

ⁱⁱ World Bank Group President Jin Yong Kim, July 13, 2013. "Ending Poverty Includes Tackling Climate Change."

<http://www.worldbank.org/en/news/opinion/2013/07/10/op-ed-ending-poverty-includes-tackling-climate-change>

ⁱⁱⁱ IEA 2011. Energy for All: Financing Access for the Poor. P 21.

http://www.worldenergyoutlook.org/media/weowebiste/energydevelopment/weo2011_energy_for_all.pdf

Mr. WHITFIELD. Thank you.

Dr. Moss, you are recognized for 5 minutes.

STATEMENT OF TODD J. MOSS

Mr. MOSS. Thank you, Chairman Whitfield, and other members of the subcommittee.

Energy access is increasingly relevant to American business and U.S. foreign policy interests, especially in the fast-growing emerging markets. As a development policy scholar at the nonpartisan Center for Global Development and a former State Department official, I am going to focus this morning on the international dimensions and what the U.S. really can and should be doing about it.

I have three points this morning. One, the energy gaps are huge and very harmful; second, the U.S. can and should be a leader in expanding energy access abroad; and three, to succeed, we have to be honest about how our policy choices may have the practical effect of denying power to the world's poorest.

First, more than 1 billion people today live without electricity. Turning on a light, heating our homes, using a computer or a fridge are things that we in the United States view as simple conveniences of modern life. In Africa, as we have heard, some 600 million people, almost twice the population of the United States, live with no electricity at all. Even those with access to power use an absolute fraction of the power that we do.

I was recently shopping for a new refrigerator with my son, who is here with me today, and I was reading those little yellow ENERGY STAR tags, and my new fridge uses five times power per year than the average person in Tanzania or Liberia.

This lack of electricity is devastating to both lives and livelihoods. Without electricity, people are forced to cook with wood and charcoal. This creates indoor air pollution, which then leads to premature death. The best global estimate we have is that there are 3½ million premature deaths every year from indoor air pollution, so energy poverty kills more people than AIDS and malaria combined. The effect on jobs and economic growth is stifling. World Bank data show that the lack of affordable and reliable electricity is the top constraint to business expansion in Africa.

Second point, the U.S. Government has a very vital role to play in closing this energy gap. African governments are prioritizing electricity estimates. European countries, China, and other nations are increasing their commitment to energy access and it is time for the U.S. to play its part, too. In our own history, our government has been fundamental in the expansion of electricity to underserved areas and ensuring that American industry has sufficient and affordable energy to be competitive. This policy had both a human face and was pro-growth.

Last June, President Obama launched Power Africa. This very promising initiative supports a doubling of energy access in the continent. Ordinarily, the agency best positioned to lead this effort, the Overseas Private Investment Corporation, or OPIC, is hamstrung by outdated policies and legislation. This little-known but high-performing agency supports the American private sector through insurance and project finance, not aid. This is commercial

finance. And what OPIC needs is not more money but they need more authorities and flexibility to fulfill their mission.

Fortunately, the Electrify Africa Act introduced last year by House Committee on Foreign Affairs Chairman Royce and Ranking Member Engel is being marked up today. Congressional action is important because it will power OPIC and provide a foundation so these efforts outlive the current administration.

Momentum in Congress is encouraging, yet just as the U.S. is pushing expanded access, other policies are adding restrictions on financing for natural gas and even hydropower. This comes unfortunately at just the moment when many African countries are discovering natural gas and understandably they want to use some of those resources to produce electricity at home. Indeed, all six of the Power Africa focus countries are either producing or exploring for oil and gas today.

Ghana, a close U.S. ally, is a good example. Ghana wants to use its newly discovered natural gas to expand access and grow its industry. If the U.S. is limited in our ability to assist, and many advocacy groups concerned about greenhouse gas emissions are pushing to prevent any gas-fired power plants in Ghana, as we consider our position, it is worth noting in the United States we have over 3,400 fossil fuel plants. Ghana has two.

My final point is that we cannot wish away these tradeoffs of our energy policy choices. An emphasis on clean technology is a very good idea where it is feasible and it deserves active U.S. support, but the scale of the problem is so great that those approaches will simply not be enough. People living without power are not all in isolated villages. As we have heard from Mr. O'Brien, some 200 million Africans living without electricity are in cities and towns. Connecting these fast-growing urban areas will require more large-scale generation and expanding the grid.

Even in rural areas in Africa, people are not as spread out as some people imagine. In Kenya, only 20 percent of the population has access to power, but a careful study by the University of California Berkeley shows that 75 percent of the population lives within a mile of an existing transmission line.

Solar lamps, also very popular, it is a fine invention, but consumer demand is going to be much greater than having a single light bulb and a cell phone charger. No country would rationally accept solar lamps in lieu of a modern energy system that can generate jobs and growth.

A final common mistake is assuming that universal energy access can be achieved entirely through renewables. Instead, there is a clear tradeoff between strictly focusing on renewables and expanding access. My colleague Ben Leo and I estimate that allowing OPIC to invest in natural gas power projects could provide, for the exact same money, access for 60 million more people over a renewables-only strategy. At the very least, we should make an exception to any public financing restrictions for the poorest countries with the least emissions.

To conclude, no one would openly argue that we should fight climate change on the back of the world's poor, but we must be very careful not to burden the poorest nations with romantic notions of an energy future that does not yet exist. If an all-of-the-above ap-

proach is good enough for the United States, how can we in good conscience stand in the way of the world's poorest countries using locally available energy sources to provide electricity for their own people?

Thank you.

[The prepared statement of Mr. Moss follows:]



U.S. Policy and Tradeoffs in Promoting International Access to Energy

Testimony before the House Energy and Commerce Committee
Subcommittee on Energy and Power

Dr. Todd J. Moss
Senior Fellow and Chief Operating Officer
Center for Global Development
February 27, 2014

Thank you, Chairman Whitfield, Ranking Member Rush, and other members of the Subcommittee. I appreciate that the Subcommittee is holding a hearing on energy access, which is now a leading development issue and increasingly relevant to American business and foreign policy interests in the fast-growing emerging markets.

As a development policy scholar and former State Department official, I will focus my testimony on the international dimensions of energy access and what the United States can do to expand it. I am testifying in a personal capacity, but my organization, the Center for Global Development, is an independent, non-partisan, non-profit, research organization dedicated to reducing poverty and promoting economic opportunity around the world.¹

I have three points to make: (1) energy gaps are huge and harmful; (2) the United States can and should be a leader in expanding energy access abroad; and (3) to succeed, we have to make clear and consistent policy choices, and be honest about how those choices affect the world's poor.

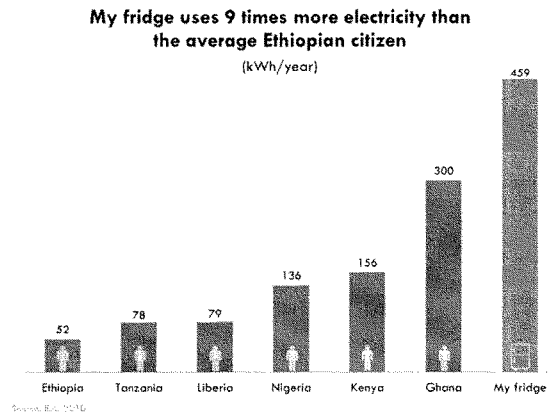
¹ www.cgdev.org

First, the lack of access to electricity is immense, striking, and extremely harmful. Today, at least a billion people live without electricity. The ability to turn on a light, heat our homes, use a computer, or keep food and medicine cold is something that we in the United States do not view as a luxury but rather as a simple convenience of modern life. When the power goes out, the American public panics—and often complains to their congressional representatives. But for many people around the world, this lack of power is an everyday reality.

In Africa, where the power shortages are the most severe, the majority of people, some 600 million, live with no electricity at all.

According to the International Energy Agency, the average American uses more than 100 times as much energy as the average Nigerian. The average person in Tanzania and Liberia uses less than 80 kWh per year, versus more than 12,000 kWh for an American. I was recently reminded of what 80 kWh really means when I was shopping for appliances and saw the yellow Energy Star tags. My new refrigerator uses 459 kWh per year – or more than five times as much as the average Tanzanian or Liberian (Figure 1).

FIGURE 1



The harm to people of living without electricity is very real. A major study on global disease burden in the *Lancet* estimates that indoor air pollution from biomass contributes to 3.5 million premature deaths per year.² In other words, cooking with wood or charcoal is killing more people worldwide than AIDS and malaria combined. Furthermore, some 60 percent of refrigerators used in health clinics in Africa have unreliable electricity, compromising the effectiveness of vaccines and pharmaceuticals used to fight these and other diseases.³

Living without power also affects education and jobs. Students cannot study at night without lights. And surveys conducted by the World Bank have consistently pointed to the lack of

² Lim S.S et al., 2012, A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, *Lancet*, 380: 2224-60.

³ GAVI Alliance, 2012, *National Ownership of Innovative Supply Chain Technologies*. Partners Forum 2012.. <http://www.gavialliance.org/library/pf2012-sessions/11-%E2%80%93-national-ownership-of-innovative-supply-chain-technologies/>.

reliable electricity as a top constraint to business growth.⁴ In fact, in Nigeria, 97 percent of large firms surveyed have their own generators.⁵ This is grossly inefficient, costly, polluting, and undermines competitiveness. With a growing population of unemployed youth in Nigeria and all other African countries, helping to build job-creating industries is in both our economic and security interests.

Second, the U.S. Government has a clear role to play in closing the energy gap. For the reasons outlined above, nearly all African governments have prioritized investing in and expanding access to electricity. Many are putting ambitious action plans on the table. In response to this demand, the Europeans, the Chinese, and other nations have increased their commitment to expanded energy access. Indeed, the United Nations has set a goal to provide universal access to energy services by 2030.

Now is the time for the United States to play its part too. In our own history, our government has been critical in supporting the expansion of electricity to underserved areas and to ensuring that American industry has sufficient and affordable energy supplies to be competitive. We can make a modest but important contribution to this effort globally in a way that benefits Africans and American businesses.

⁴ Ramachandran V., Gelb, A., and Shah, M. K. 2009, *Africa's Private Sector: What's Wrong with the Business Environment and What to Do About It*, Center for Global Development, Washington DC.

⁵ See enterprisesurveys.org.

In June 2013, President Obama launched the Power Africa initiative, which mobilizes a range of U.S. government agencies to help support a doubling of energy access on the continent.⁶ Initially focusing on six countries (Kenya, Tanzania, Ethiopia, Nigeria, Ghana, and Liberia), Power Africa is a timely idea and already off to a promising start. If followed through in a practical and realistic manner, the United States can play a constructive role in bringing electricity to millions of people living without it.

However, Power Africa's ultimate success, as both a development and diplomatic effort, will depend on overcoming several obstacles. As long as it exists as a White House initiative and spread across at least a dozen agencies, its long-term success is in doubt. Without a clear champion and home agency, Power Africa could become yet another high-profile presidential effort announced with great fanfare, then allowed to die a quiet death.

Even more troubling, the agency best positioned to lead this effort, the Overseas Private Investment Corporation (OPIC), is hamstrung by outdated policies and legislation. This little-known but high-performing government agency supports the private sector through insurance and project financing. What OPIC needs is not more money, but additional authorities and flexibility to fulfill its mission.⁷

⁶ White House, June 30, 2013, "Fact Sheet: Power Africa." Office of the Press Secretary.
<http://www.whitehouse.gov/the-press-office/2013/06/30/fact-sheet-power-africa>.

⁷ Benjamin Leo, Beth Schwanke, and Todd Moss, "OPIC Unleashed: Strengthening US Tools to Promote Private-Sector Development Overseas," Center for Global Development, August 2013.
<http://www.cgdev.org/publication/opic-unleashed-strengthening-us-tools-promote-private-sector-development-overseas>

Fortunately, the Electrify Africa Act, introduced last year by House Committee on Foreign Affairs Chairman Ed Royce and Ranking Member Eliot Engel, is being marked-up this week. This bill would promote energy access on the continent in a strategic, transparent way that marshals the U.S. government agencies that operate abroad. Congressional action is important because it will further empower OPIC and other government agencies, while providing a long-term policy foundation that can ensure these efforts outlive the current Administration.

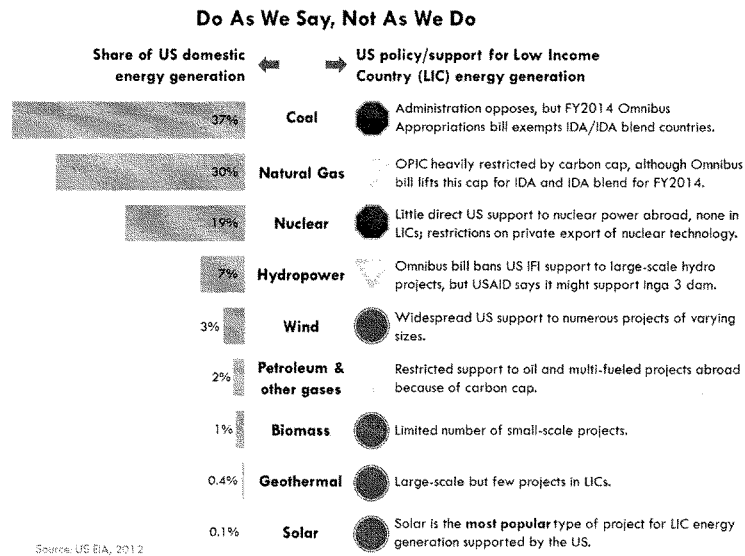
While momentum in Congress is encouraging, it is concerning that other U.S. policies are moving in the opposite direction. Just as the U.S. is seeking to expand energy access, other policies are increasing restrictions on financing for natural gas and hydropower. This comes at the exact moment when many African countries are discovering natural gas and want to use part of their reserves to produce electricity at home. Indeed, all six of the Power Africa focus countries are either producing, developing, or exploring for oil and gas.

Ghana is a good example. The country is a close U.S. ally which recently discovered natural gas and would like to use this resource to expand access and grow its industry. Yet current U.S. policy restricts our ability to assist them in building any new gas plants and many advocacy groups want to prevent Ghana from generating additional power via natural gas out of concern over potential greenhouse gas emissions. As we consider the U.S. position on this, it is worth keeping in mind that we currently have more than 3,400 power plants running on fossil fuels in the United States.⁸ Ghana has two.

⁸ *Electric Power Annual*, U.S. Energy Information Administration, Table 4.1. Count of Electric Power Industry Power Plants, by Sector, by Predominant Energy Sources within Plant, 2002 through 2012, http://www.eia.gov/electricity/annual/html/epa_04_01.html

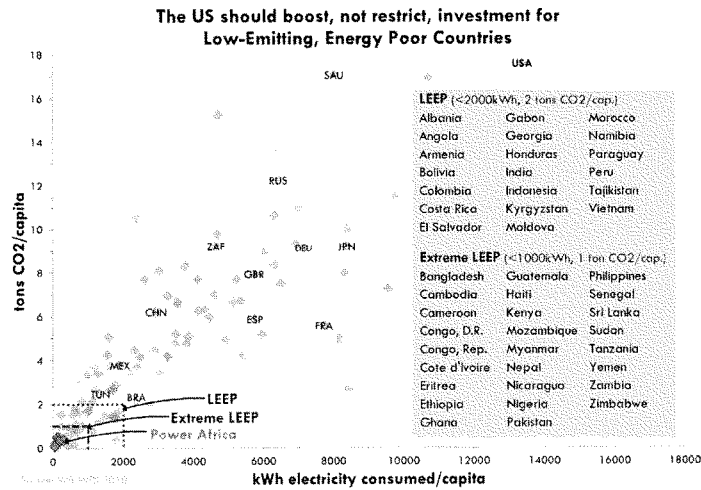
The United States is thus sending conflicting signals by taking active steps to prevent other countries from using the very sources that provide 93 percent of our own domestic electric power generation (Figure 2).

FIGURE 2



If an all-of-the-above approach is good enough for the United States, how can we in good conscience stand in the way of the world's poorest countries using their own resources to provide electricity for their own people? At the very least, we should make an exception to restrictions for the countries most in need. One option is to exemption countries designated as low-emissions, energy poor (LEEP) from any restrictions on public finance (Figure 3).

FIGURE 3



My third and final point is that we cannot avoid the direct tradeoffs of our energy policy choices. An emphasis on clean or low-carbon energy is a good idea where it is feasible and appropriate. We must encourage the next wave of technology and business models to create new ways of producing and delivering energy. Off-grid renewable power is viable and cost-competitive in some places and deserves our support. But the scale of the energy gaps in the world and the realities of energy poverty also mean that such approaches are far from enough.

Many argue that it makes no sense to build power plants at scale on the mistaken premise that those living without power in other countries primarily reside in isolated villages, far from any grids. This is false. Today, some 200 million Africans without electricity live in cities and towns. More than half of the poor residents of major cities like Nairobi and Dakar do not have power. Connecting these fast-growing urban areas will require more power generation and expansion of

the grid. This may not be trendy, but it is still the most efficient way to provide modern energy for concentrated populations.

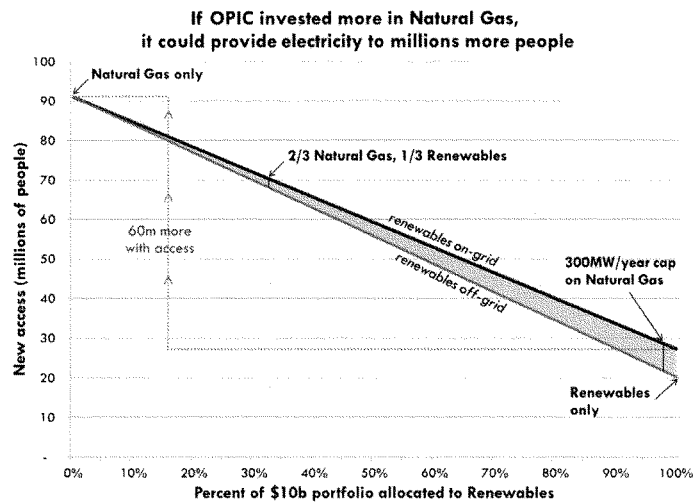
Another widely held misperception is that, like cell phones, new technology will make power plants and grids irrelevant. It is true that solar lamps are one way to provide light and perhaps charge a cell phone. But few consumers would be satisfied with this minimal amount of power.⁹ And no country would accept solar lamps in lieu of a modern, large-scale energy system required to generate growth and jobs.

A final common mistake is assuming that universal energy access can be achieved entirely through renewable sources. Based on prices and capital markets today, this is incorrect. In the real world of limited resources, there is a direct tradeoff between strictly focusing on renewables and expanding access. For example, my colleague Benjamin Leo and I estimate that allowing OPIC to invest in natural gas power projects could provide access to 60 million more people than the number reached by a renewables-only portfolio (Figure 4 and Appendix 1). This difference is driven by the higher cost of renewables per megawatt of generation and the ability to leverage greater private capital for natural gas projects.¹⁰

⁹ Morgan Bazilian and Roger Pielke, Jr., "Making Energy Access Meaningful," *Issues in Science and Technology*, Summer 2013. http://sciencepolicy.colorado.edu/admin/publication_files/2013.22.pdf

¹⁰ Todd Moss and Benjamin Leo, "Maximizing Access to Energy: Estimates of Access and Generation for the Overseas Private Investment Corporation's Portfolio," Center for Global Development, January 2014. <http://www.cgdev.org/publication/maximizing-access-energy-estimates-access-and-generation-overseas-private-investment>

FIGURE 4



To conclude, no one would openly argue that we should fight climate change on the back of the world's poor. But we must be careful not to burden the poorest nations with romantic notions of an energy future that does not yet exist. If the United States is serious about closing the huge gap in energy access, we need to work in partnership with American businesses to extend our experience, capital, and innovation in generating abundant and affordable electricity for all.

Thank you.

Attachment:

Todd Moss and Benjamin Leo, "Maximizing Access to Energy: Estimates of Access and Generation for the Overseas Private Investment Corporation's Portfolio," Center for Global Development, January 2014.

APPENDIX 1:**Maximizing Access to Energy: Estimates of Access and Generation for the Overseas Private Investment Corporation's Portfolio**Todd Moss & Benjamin Leo¹¹

January 2014

Summary

We conservatively estimate that more than 60 million additional people in poor nations could gain access to electricity if the Overseas Private Investment Corporation were allowed to invest in natural gas projects, not just renewables.

Policy Context

Boosting energy access is a major development objective and a policy priority for the United States. More than 1 billion people worldwide and the majority of people living in sub-Saharan Africa lack access to even basic electricity. This energy poverty affects health (household air pollution from solid fuels used for lighting, heating, and cooking contribute to 3.5 million premature deaths per year), education (most African schoolchildren attend school with no electricity and cannot study effectively in the dark), and jobs (lack of reliable and cost-effective electricity is among the top constraints to growth).

President Obama's Power Africa initiative, launched in June 2013, aims to increase electricity generation and access to modern energy services in six low-income countries. The success or failure of this effort will be determined in large part by the investment decisions of a dozen or so US government agencies that may be operating under potentially conflicting mandates. The Overseas Private Investment Corporation (OPIC), the main US development finance institution, will play a central role. How it selects projects will affect outcomes in Africa for the Power Africa initiative and OPIC's activities in other low-income countries.

A critical policy question for the administration is how the fuel mix in OPIC's portfolio might affect the generation and access targets for the world's poor. In this note, we draw on publicly available data from the International Energy Agency (IEA), the Congressional Research Service (CRS), the US Department of

¹¹ We thank Stephanie Majerowicz for the original data work, Madeleine Gleave for additional analysis, and Jonah Busch for comments. Any errors are solely those of the authors.

Energy, and OPIC, to provide a rough estimate of the tradeoffs as an input to the fuel-mix debate. We focus specifically on the affect that allowing investment in natural gas would have.

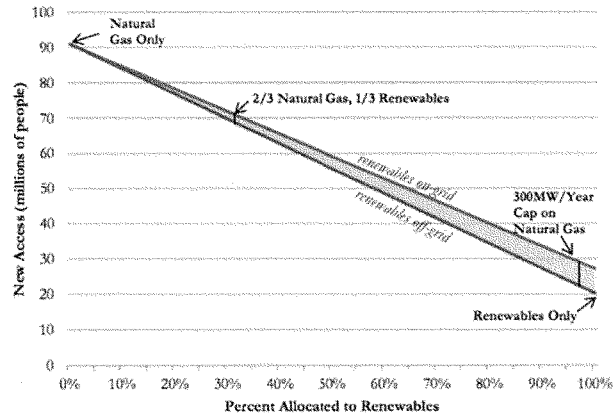
There has been a general bias toward using OPIC to invest principally in solar, wind, and other low-emissions energy projects as part of the administration's effort to promote clean energy technology. An explicit policy capping the total greenhouse gas emissions in OPIC's overall portfolio has further pushed the organization's investments heavily toward renewables. Indeed, over the past five years, OPIC has invested in more than 40 new energy projects and all but two (in Jordan and Togo) are in renewables.

The 2014 omnibus appropriations legislation lifts the greenhouse gas restriction on OPIC's portfolio for projects in low-income countries for the current fiscal year, but the medium-term policy is under debate. Congress will also likely consider a version of the Electrify Africa Act again in 2014. Meanwhile, many African countries have significant natural gas deposits and have declared their desire to utilize that resource for domestic power generation. Of the six countries in Power Africa, four are already producing or developing natural gas and two are exploring its use (see annex A).

Energy Investment Tradeoffs: Additional Access and Generation Simulations

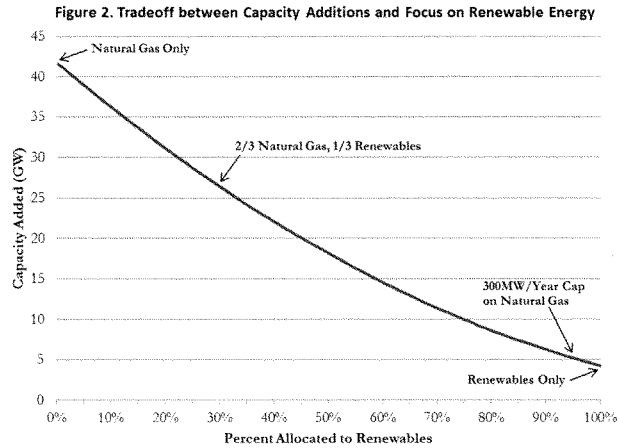
Figure 1 shows estimates of access based on the allocation of a \$10 billion portfolio (what OPIC might reasonably commit over multiple years given modest additional administrative budget) to a mix of natural gas and renewable energy projects. A natural gas-only portfolio could provide electricity access to 90 million people versus 20–27 million people with a renewables-only portfolio. Thus, we estimate that more than 60 million additional people in poor nations could gain access to electricity if OPIC were allowed to invest in natural gas projects, not just renewables.

Figure 1. Tradeoff Between Access to Electricity and Focus on Renewable Energy



The result is driven principally by the higher private investment leveraging ratios of natural gas projects (5:1 versus 1.5:1 based on OPIC's historical portfolio). Projections of deploying on-grid and off-grid options are based on IEA estimates (\$550 and \$740 per person, respectively). Additional methodological information is contained in Annex B.

Figure 2 shows estimates of additional generation capacity based on the allocation of the same \$10 billion portfolio to a mix of natural gas and renewable energy projects. A natural gas-only portfolio could provide an additional 42,000 MW of electricity versus 4,200 MW in a renewables-only portfolio. Thus, we estimate that about 38,000 MW of generation is at stake. This is equivalent to about three times the entire installed capacity of all six countries in the Power Africa initiative (see annex A).



The result in this case is driven by both higher private investment leveraging ratios for natural gas projects and conservative estimates of capital costs per megawatt (\$1.2m/MW for gas and \$3.5m/MW for renewables). Additional methodological information is in annex B.

Potential Policy Compromise – Balancing Renewables and Access Objectives

A potential policy compromise, which is highlighted in both graphs, could support both OPIC's continued investment in renewable energy and substantially boost access for the poor. A targeted mix of two-thirds gas and one-third renewables would increase access for 70 million people and generate approximately 25,000 MW of additional capacity. (By comparison, the United States uses coal and gas for two-thirds of its own power, with the balance principally hydro and nuclear.) Reaching this two-thirds natural gas target for OPIC, however, would require additional policy flexibility, including a revision of the emissions cap or how it is calculated.

There are other reform options, which may enable expanded access while also continuing to encourage OPIC to invest in the next generation of renewable energy. These options are the subject of a forthcoming paper.

Annex A

	Access to electricity	Millions w/o access	Installed capacity (MW)	Estimated demand (MW)*		Gas production
				2010	2030	
Liberia	0.5%	3.9	200	1118	705	Exploring
Tanzania	14.8%	38.3	840	10916	9835	Producing 30 Bcf; new discoveries estimate reserves of 28.7 Tcf
Kenya	18.1%	33.5	1700	9908	7681	Exploring; small initial discoveries
Ethiopia	23.0%	67.1	2060	18933	14404	Estimated reserves 4 Tcf; beginning to develop gas fields
Nigeria	50.3%	79.4	5900	24139	33489	Producing 1.1 Tcf; 182 Tcf proven reserves (10 th largest globally)
Ghana	60.5%	9.6	1990	3241	3630	800 Bcf proven reserves; building pipeline

Sources: WDI, US EIA

*Demand is estimated using average consumption levels for Tunisia (1260 kWh per capita). See <http://www.cgdev.org/blog/how-much-power-does-power-africa-really-need> for full explanation of estimation.

Annex B

Table 1: Access and Capacity of \$10 billion in OPIC Investment in Power

Scenario:	Total capital (\$bn)	New Access (million people)	Capacity Additions (MW)*
(1) Renewable only	15.0	20-27	4,200
(3) Renewable 1/3, Gas 2/3	38.3	67-70	25,000
(2) Natural Gas only	50.0	90	42,000
(4) Cap Only 1500MW gas	16.3	22-30	5,600

*Based on conservative estimates from CRS study

Table 2: Incremental Access Efficiency Estimates

Type	Annual Investment (\$ bn)	People Gaining Access annually (m)	\$/person gaining access
On-grid	11.0	20	550
Mini-grid	12.2	19	642
Off-grid	7.4	10	740

Source: IEA, World Energy Outlook, 2011, pg. 31.

Methodology

$$\text{New Access} = \text{Investment} * \left(\frac{(\% \text{ on-grid} * \text{multiplier}_{\text{on}})}{\text{efficiency}_{\text{on}}} + \frac{(\% \text{ off-grid} * \text{multiplier}_{\text{off}})}{\text{efficiency}_{\text{off}}} \right)$$

I. Investment: Assume a baseline OPIC investment of \$10 billion.

II. New Access Per Dollar of Investment (*efficiency*): The International Energy Agency estimates that the amount of investment required to achieve access to electricity for all households. Their estimates of annual investment needed by type (on-grid, mini-grid and off-grid), along with their projections of the number of people this would give access to, yields a simple per capita average cost of extending access (see table 2 above). Because reaching the last million people without energy access will almost certainly cost more than the first million, using an average cost provides a conservative estimate. The IEA incorporates this diminishing returns principle in their estimates for cost per person gaining new access (see IEA World Energy Outlook 2011, pg. 31, for details).

III. OPIC Leveraging Ratios (*multiplier*): Based on past and current energy projects for which data is available, OPIC has historically financed on average 20 percent of the total cost of natural gas projects and 60–70 percent of renewable energy projects. Assuming ratios of 1/5 and 2/3 for natural gas and renewable energy respectively yields crowding-in multipliers of 5:1 and 1.5:1. Following the IEA's assumption that on-grid investment will be 2/3 fossil fuel, 1/3 renewable, we estimate a leveraging ratio for on-grid of 3.83 [equal to $5(2/3) + 1.5(1/3)$] and for off-grid (presumed, as per IEA, to be only renewables) of 1.5.

Table 3: Overnight Capital Costs per MW by Technology (USD/MW)

Average	Sample of OPIC historical portfolio	DOE Meta-Study	CRS Estimates (US sample)
Natural Gas	591,909	768,750	1,200,000
Renewables (weighted average)*	3,726,049	3,650,250	3,567,000
Wind	1,383,333	1,700,000	2,100,000
Geothermal	8,260,000	3,825,000	3,200,000
Solar Thermal		4,883,333	3,400,000
Solar PV	5,650,892	6,000,000	6,600,000
Hydro	na	na	na
Biomass	2,952,976	3,012,500	3,000,000

Sources: CRS, DOE, author calculations based on public data from OPIC.

*Weighted renewables average calculated using IEA predictions for renewables mix most suited for extending energy access (28% wind, 36% solar, 21% biomass, 8% hydro, 7% others). Weights adjusted to account for lack of data on hydro technologies.

IV. Capacity Additions Per \$ of Investment: We examined three different estimates of cost per MW of additional capacity, both on aggregate and by energy source: averages from OPIC's own energy project portfolio, a Congressional Research Service (CRS) study on power plants, and a Department of Energy (DOE) meta-study.* For the projections included in table 1 and model in figure 2, we use the most conservative assumptions as contained in CRS.

*Stan Kaplan, "Power Plants: Characteristics and Costs," Congressional Research Service Report, November 13, 2008; Tidball, Rick, Joel Bluestein, Nick Rodriguez, and Stu Knoke, "Cost and Performance Assumptions for Modeling Electricity Generation Technologies," National Renewable Energy Laboratory, Department of Energy, November 2010; OPIC estimates based on author calculations using available data from OPIC.gov.

Mr. WHITFIELD. Well, thank you very much, Dr. Moss, and thank all of you for your testimony.

You know, your testimony raised some great issues because while we do have many problems in America as we make this transition—and I still maintain we are transitioning too quickly to renewables—but basically, you have America and Europeans and wealthy nations dictating to developing nations on exactly what kind of energy they are going to have.

And, of course, Mr. O'Brien, in your testimony, I mean Oxfam has a great reputation. In your testimony you talked a lot about climate change, and obviously, whenever you talk about this issue, you have got to talk about climate change. And I want to read an article that I read just recently about the most recent AR5 assessment report of the Intergovernmental Panel on Climate Change, which says it acknowledged that the lack of warming since 1998—there has been a lack of warming since 1998—and there are growing discrepancies between observations in reality and the climate model projections. There is evidence of decreased climate sensitivity to increases in atmospheric CO₂ concentration, evidence that the sea level rise during 1920 to 1950 was the same as 1998 to 2012, and that the Antarctic ice mass is increasing, also, that types of weather extremes were worse in the '30s and even in the '50s than they are today.

And there are a large group of scientists who are saying because so much of CO₂ emissions are natural, that is having a much greater impact certainly than manmade. So none of us question the concern about greenhouse gas-enhanced climate change, but we should not be such alarmists, and the international news media I think is contributing to this because we need to start acknowledging that there are some real discrepancies in these model projections and the reality, as is pointed out in this AR5 assessment report that was issued in the fall by the IPCC.

So here we are talking about we have got these financial institutions under pressure from the Obama administration dictating on what the electricity is going to be produced from in these developing countries. And I mean that is a concern that you expressed also, Dr. Moss.

But anyway, one of the questions I wanted to ask you, Mr. Coleman, I mentioned in my opening statement about how, with this cold spell that we had, and we had Southern Company, we had AEP, we had Luminant, we had even the nuclear plants talking about the impact of these regulations, and 89 percent of the AEP coal fleet is going to go down, Southern Company, 75 percent that was operating at capacity is going to go down, all because of these regulations.

And many of us are concerned about when you have spells like this, the renewables, I mean how can you just meet your requirements with reliability without these plants? Would you just comment on that for me?

Mr. COLEMAN. Well, Mr. Chairman, I think the short answer is we can't. Baseload generation are our fossil fuel plants. And I will give you a disclaimer; I am in the distribution business. I am not a generation and transmission expert. But the power that we purchase, you know, we have to have the baseload generation there.

Renewables are great. We are all for renewables. We have got renewables in our portfolio. And as you said, in Arkansas we have got a campaign called The Mix Matters, and it says you have got to have a mix of all-of-the-above energy strategy, not all-but-one energy strategy.

So renewables play a part, certainly, the wind renewables that we have, but it is not baseload generation. Fortunately in Arkansas we are part owners of the newest coal plant in the country, an ultra-supercritical coal plant, the Turk plant, and we could not build another one today under today's EPA rules. So, yes, we have got to have the basic generation or my people are out of power.

Mr. WHITFIELD. You know, these are such real issues with such dramatic impacts on people, and I really think the Obama administration is not being truthful with the American people when they set the emission standards on these new plants based on plants that will not be built without a lot of government support. And none of these plants are in full operation yet. That is the thing that is so disturbing to me and many other people.

My time is expired so I would like to recognize the gentleman from California for 5 minutes.

Mr. MCNERNEY. Well, thank you, Mr. Chairman.

What I am hearing this morning is a conflict between the legitimate desire to provide electric power to people in the world to make their lives better so that they can live in a modern world on the one hand, and on the other hand, providing electric power requires fossil fuels to be burned, which increases the problems associated with climate change. So the risk in my opinion of the climate change is the bigger risk. But we can't overlook the need to provide power. So that is the fine line that we need to develop and to walk. And to say that one side or the other is totally right or wrong is missing the point in my opinion.

Mr. Biewald, you had an interesting comment I believe in your opening statement that you thought that it was possible to provide responsible power and create jobs without increasing the price of electricity. Would you expand a little bit on that, please, in a minute or so?

Mr. BIEWALD. Absolutely. In the States that we have looked at, it is perfectly plausible with a little bit of planning to retire some plants and replace them with alternatives that really don't cost any more, in fact, in many cases cost less. And so it helps the consumers.

In Kentucky, for example, we did a study where adding efficiency and renewables, displacing some fossil fuels, added 20,000 net jobs by the year 2020. So it is helping the economy, it is keeping the reserves at a level that is required for liability and at reasonable cost to the customers.

Mr. MCNERNEY. Would that increase their price of electricity for the customers?

Mr. BIEWALD. It need not. What happens is the efficiency opportunities are so inexpensive and such low-hanging fruit and so attractive that those are available and decrease the prices a lot. The renewable prices are a mix. Some renewables are less than the conventional supply and some renewables are more. In terms of intermittent renewables coming on the grid, say wind, as Mr. Coleman

points out, we need to sort of baseload demand for electricity, but that baseload can be served by some mix of resources, including, say wind, with natural gas backing it up. So that provides in combination baseload power that serves that baseload demand reliably.

Mr. MCNERNEY. Thank you. Mr. O'Brien, I would like you to sort of expand that discussion to the international situation.

Mr. O'BRIEN. Well——

Mr. MCNERNEY. How could we provide power to international customers that don't have power now——

Mr. O'BRIEN. Right.

Mr. MCNERNEY [continuing]. Using responsible low-carbon emission methods?

Mr. O'BRIEN. What has changed radically for us as a development organization is where wealth that is driving economic growth is coming from. Let's take countries we have been in in the last several decades, Kenya, Tanzania, Uganda, Mozambique. In the last 3 years, those four countries have discovered 130 trillion cubic feet of gas. They have discovered 2 billion barrels of oil. They don't need our help to burn more fossil fuels. In the same environment, they have populations facing extreme weather events all the time. They have got coastal regions where fishing communities are being wiped out; they have got farmers who are losing their livestock and their crops.

What we are asking is that the United States plays a leadership role in helping the global economy move off an overreliance. We want to be the ones associated with the hospital in Haiti that is able to run through solar power an entire hospital to cater for 6,000 patients. We want to be associated with that.

Mr. MCNERNEY. So another thing that scares me about climate change is the potential to drive political and military conflicts. Would you expand on that a little bit, please?

Mr. O'BRIEN. Today, there are 2 billion people under water stress. Many of them live in insecure regions where their governments don't have confident control of their territories and they are not frankly anything close to the kind of strong democracies that we would like to see. Climate is only going to exacerbate local tensions based on lack of access to important resources like water and so on. If we don't tackle the consequences of climate change, we are going to be dealing with the stresses on governance and on security in much of the Sahel, in much of central Asia where I spent a lot of time, and in many other areas which are really facing water stress is perhaps the easiest way to understand it.

Mr. MCNERNEY. Well, thank you, Mr. Chairman.

Mr. WHITFIELD. At this time I recognize the gentleman from Texas, Mr. Barton, for 5 minutes.

Mr. BARTON. Thank you, Mr. Chairman. You may have done this before I arrived but we have former Congresswoman Jo Ann Emerson in the audience, and if she wasn't introduced, we welcome you back to the committee and we are glad to have you in your new position today.

Mr. WHITFIELD. Yes, thank you for doing that. We hugged and kissed before but we didn't do it publicly.

Mr. BARTON. Well, I missed out on that unfortunately, dadgummit.

We have been throwing around a lot of terms here today, Mr. Chairman, and just for the record I want to try to clarify some of these before I ask some policy questions.

My first question—and I don't know who to ask this to, I guess the utilities commissioner from North Carolina, Mr. Finley—is the cost of CO₂ the same as the cost of carbon?

Mr. FINLEY. Well, there is a lot of ways to measure the cost of carbon. Of course, carbon involves more than CO₂. It involves methane and other types of—I am no expert on the cost of carbon so that is about the best answer I can give you.

Mr. BARTON. OK. Well, let me try it another way. When we talk about the cost of CO₂, are we talking about the actual cost of obtaining CO₂ for a productive purpose such as oilfield injection or something of that sort or are we talking about the cost of complying with various CO₂ remediation and reduction regulation?

Mr. FINLEY. In my opinion, it is the latter as opposed to the former. There is a lot of cost involved in taking the CO₂ out of the smokestack and making the plants compliant with whatever regulations that we do come up with and retrofitting plants to be able to accomplish that.

Mr. BARTON. So we are really talking about the cost of regulatory compliance?

Mr. FINLEY. I think that is a large cost, yes.

Mr. BARTON. Does anybody disagree with that, anybody on the panel? I don't see—

Mr. BIEWALD. Well, some people do talk about the cost of buying CO₂ as an industrial product. No one here today—

Mr. BARTON. But that is not what your chart was?

Mr. BIEWALD. No, no, and my chart has to do with the price of carbon or carbon dioxide for purposes of planning. So we are certainly talking about that. Some of us are also talking about the societal cost of the carbon emissions, so the cost of the damages associated with the carbon emissions. So there is both sides to it.

Mr. BARTON. Which is a very subjective thing, very speculative. This pencil lead is carbon. I know what that costs. I know what this pencil cost. Your chart and all this, it is in the eye of the beholder what you want to apply to that. At least in my opinion it is.

Do these compliance costs result in any increased efficiency in the generation of electricity or any lowering of electricity cost? And I will ask the gentleman from the electric co-op in northern Arkansas that question.

Mr. COLEMAN. Again, Congressman, I am a distribution guy; I am not a generation guy. Would you restate the question for me one more time?

Mr. BARTON. Well, I was trying to get you to say no—

Mr. COLEMAN. No.

Mr. BARTON [continuing]. It just raises the cost.

Mr. COLEMAN. That is what I heard, no.

Mr. BARTON. OK. That is the answer I wanted. I only have a minute left. The vice president of Oxfam, I was really impressed by your testimony. I mean you seem to be in the real world and not some starry-eyed idealist, which I am an industrial engineer by training so I really did appreciate what you said. So my question

to you, and I don't think this is a loaded question and I think the answer is going to be yes, but does your organization believe that democratically elected governments that use free market capitalism principles provide the greatest opportunity for their people to have a better life in their country?

Mr. O'BRIEN. Yes.

Mr. BARTON. OK. Good. Good.

Mr. O'BRIEN. We have a way to go to get there, but yes.

Mr. BARTON. OK. Now, I wish I had another 10 minutes or 5 minutes because I would really like to get into—I actually support a lot of what you said about in these developing nations a baseline power grid system like we have in the United States is not the most efficient means of providing power in these developing countries where they are so spread out and they don't have the infrastructure, and I do believe that alternative energy sources like wind power and in some cases small hydro is the way to go.

But I also believe that there are cases where a baseload coal-fired power plant, if there is coal locally in the region, can provide an economy of scale and an efficiency that these alternative energy sources can't provide so that in my view, if you are using free market capitalism, you would have a mix in these developing countries. Would you agree? That is a pretty complicated statement.

Mr. O'BRIEN. I will tell you what I saw.

Mr. BARTON. And then I will yield back to the——

Mr. O'BRIEN. And very briefly, in my 5 years in Afghanistan I saw major infrastructure projects around energy start and flounder because the government was weak, like you say, or didn't have the capacity to get things going or it got stolen or there wasn't security on the grounds to actually move the thing forward fast enough.

But at the same time, I went to some of the most remote bases and saw small micro hydros literally change the options for women and children.

Mr. BARTON. Right.

Mr. O'BRIEN. And I see what is going on in Pakistan today, and even if we get those lines across Afghanistan to provide power, I don't believe that government has what it takes to collect the revenues needed to sustain a big energy economy. That is why I think in many respects if we want to meet real needs, we have got to go smaller and meet people where they are at.

Mr. BARTON. I agree with that. Mr. Chairman, I yield back.

Mr. WHITFIELD. The gentleman's time expired a long time ago, but at this time I would like to recognize the gentleman from California, Mr. Waxman, for 5 minutes.

Mr. WAXMAN. Thank you, Mr. Chairman. I will try to do my questions within the 5 minutes, but I see that you are being liberal and allowing people to go over, but I will try to stay within the 5 minutes.

Coal-fired power plants are responsible for one-third of the Nation's carbon dioxide pollution. A new coal-fired power plant can cost billions of dollars and might be expected to operate for 40 years or even longer. Given what we know about climate change, it doesn't make sense to invest in a new coal plant without considering the long-term liability of its pollution.

Mr. Biewald testified that many electric utilities are looking for ways to minimize their carbon pollution such as by including costs of carbon in their integrated resource plans or IRPs. In 2013, the Arkansas Electric Cooperative, which supplies Mr. Coleman's co-op with its power, filed an IRP with the Arkansas Public Service Commission that included carbon price scenarios starting at \$10 per ton in 2022 and escalating to as high as \$78 per ton by 2050. Last year, Duke Energy Carolinas also included a carbon price in the IRP it filed with Chairman Finley's commission. Duke looked at a carbon price of \$17 per ton beginning in 2020 and escalating over time.

Mr. Coleman and Chairman Finley, are there laws that impose these carbon prices in Arkansas or in North Carolina?

Mr. COLEMAN. No.

Mr. WAXMAN. Mr. Finley?

Mr. FINLEY. Not in North Carolina.

Mr. WAXMAN. OK. Jim Rogers, Duke Energy's former CEO, recently said, "every decision we make today we make with the knowledge that there will someday be carbon regulation in this country. There will be a price on carbon, and since we make decisions for 30 to 40 to 60 years, we need to take that into account." Mr. Biewald, do you agree with Mr. Rogers that rational utilities should include a price on carbon in planning and investment decisions even if there are no current laws that impose such a price?

Mr. BIEWALD. Absolutely, yes, because such prices are likely to be in place, policies and prices, during the life of these assets. So prudent, responsible planning really requires the companies making these decisions—

Mr. WAXMAN. Um-hum.

Mr. BIEWALD [continuing]. To anticipate that.

Mr. WAXMAN. Utilities around the country are prudently considering the cost of carbon in their business decisions. Unfortunately, there is only so much they can do on their own. In 2009, American Electric Power proposed to build a commercial-scale coal-fired power plant with carbon capture and sequestration in West Virginia, but AEP had to cancel that project when State regulators wouldn't approve the cost because no existing laws required AEP to reduce its carbon pollution. Mr. Biewald, are other utilities likely to be able to finance technologies such as carbon capture and sequestration if there are no legal requirements to control carbon?

Mr. BIEWALD. I would say in general, no. It would be difficult for commissions to approve those kind of expenditures and put them on the backs of the customers. Even a new coal plant without carbon capture and sequestration is sort of economically unviable, so in that regard, it is not about the carbon policy or the price of carbon. It is just the market economics of producing kilowatt hours.

Mr. WAXMAN. Well, EPA's forthcoming power plant rules would provide the regulatory certainty utilities need to build cleaner coal plants in this country, yet House Republicans recently passed the Whitfield bill out of this committee which would block EPA's rules. House Republicans might not believe climate change is real, but virtually no one in the scientific community holds this position and responsible businesses don't either. This committee needs to stop ignoring reality and start finding solutions to climate change.

In his questions a minute or so ago, Chairman Whitfield read some out-of-context quotes to suggest that climate change has paused and that there is less reason for concern. He could not be more wrong. Yesterday, the Royal Society of Great Britain and our own National Academy of Sciences published a new paper entitled, "Climate Change Evidence and Causes" that specifically addresses these and similar denialist arguments. And let me read you a key section. "Does the recent slowdown of warming mean that climate change is no longer happening? No. ... Despite the slower rate of warming, the 2000s were warmer than the 1990s. A short-term slowdown in the warming of Earth's surface does not invalidate our understanding of long-term changes in global temperature arising from human-induced changes in greenhouse gases."

So since there is still such misunderstanding about such basic facts on this committee, I would ask unanimous consent to introduce this report for the record.

Mr. WHITFIELD. Without objection.

[The information is available at <http://dels.nas.edu/resources/static-assets/exec-office-other/climate-change-full.pdf>.]

Mr. WAXMAN. Thank you, Mr. Chairman. I see that my time has expired.

Mr. WHITFIELD. Thank you.

And at this time, I would like to recognize the gentleman from Ohio, Mr. Latta, for 5 minutes.

Mr. LATTI. Well, thank you, Mr. Chairman, and thank you very much for the hearing today and thanks to our witnesses for being with us today. I really appreciate your testimony. You know, we have been experiencing a really cold winter in the United States. Across my district, tonight it is going to be 10 below again, so it has been cold.

But if I could get right to it, just a little bit about my district. I probably represent the largest number of co-ops in the State of Ohio. I probably represent the largest number of farmers in the State of Ohio. I also represent about 60,000 manufacturing jobs in the State of Ohio. And as I believe Mr. Coleman had said a little bit earlier that you need baseload capacity to turn these machines on and what you need to do to power up, and that is what we have to have in my area to make sure that people are back at their jobs in the morning working.

And if I could, Mr. Finley, I noticed with interest on page 4 of your testimony, you are describing, you know, some of the declines in your furniture businesses and things like that and then on page 5 that, you know, you are all competing for business across the country and businesses are also looking at price and reliability. How important is it to you to have that power out there to make sure that you can even bring these businesses into your State?

Mr. FINLEY. It is fundamentally important. It is one of the most important aspects of our jobs and the power companies' jobs that we regulate.

Mr. LATTI. And, Mr. Coleman, as you talk about Arkansas co-op and, you know, I also saw that in your testimony, you know, you talked about that if you are going to raise the standard of living and tackle poverty, you have got to have that power. And to be able to do that, especially tackling poverty and to have that power,

doesn't that equate to jobs that you have to have to make sure that you have it?

Mr. COLEMAN. Absolutely.

Mr. LATTA. And again in looking at your testimony, I also found it interesting, I think it was on page 2 of your testimony where you went into one of your plants is required to do \$614 million in total upgrades to a plant that cost \$1.17 billion. So you are almost at half the cost of your plant for upgrades. Who is paying for those costs?

Mr. COLEMAN. Congressman, my members are and all of the 480,000 members of the State of Arkansas are paying for those in the electric bills every day.

Mr. LATTA. OK. And when you look at that, what are your folks out there that are using the power in your companies saying when they are getting these increases in their costs? Are they saying that they can stay in Arkansas or do they have to sometimes look somewhere else?

Mr. COLEMAN. Well, I can give you an example. We have got a 10 megawatt load on our lines, and we meet with them on a quarterly basis. They are based out of Chicago, and they are the largest user of power that we have. Power is also the largest expense that they have as a business. And, you know, I meet with them across the table once a year and I hear from them that, you know, when is this going to end? And if you listen to some of the testimony today, it is not when is it going to end; it is almost like it is just beginning. So when we talk to, whether it is the industrial customer or whether I talk across the table to a residential member, and I have got some stories about how they can't pay their bills, that is the problem, the affordability of the bill and the fact that the power has got to be there when they need it.

Mr. LATTA. Thank you. Mr. Finley, if I could ask a question to you now. You also testified that the electricity rate increases are up in North Carolina are being driven largely by recent construction of power plants required in large number by need to comply with more stringent environmental regulations. When you refer to more stringent environmental regulations, what are you referring to?

Mr. FINLEY. Those have to do with the atmospheric regulations both within our State and from the national government. There are any number of them that have been driving the cost of plants in North Carolina since approximately 2002.

Mr. LATTA. Thank you. And, Mr. Moss, also when you are looking at the developing countries out there and to really get their economies moving and get the standard of living up there, you have to have jobs. And to have those jobs, you have to have that energy and especially electricity. When you are looking at that crystal ball into the future, what kind of power do these countries have to have to be able to have that baseload capacity to create those jobs to increase that standard of living?

Mr. MOSS. Many multiples of what they have now, many, many multiples.

Mr. LATTA. OK. And when you say multiples, how would you describe the multiples?

Mr. MOSS. The average person in Nigeria uses about 130 kilowatt hours per year. In the United States, the average person uses about 13,000, so we have got 100-fold. You know, for a Nigerian that wants to live an American-style lifestyle, they need a 100-fold increase in power. There is an aluminum smelter previously owned by an American company in Ghana. That has been running at only 20 percent capacity for the sole reason that they do not have enough power.

Mr. LATTA. Thank you.

Mr. Chairman, I see my time is expired and I yield back.

Mr. WHITFIELD. The gentleman's time is expired.

At this time, I recognize the gentleman from New York, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair, and thank you to our panelists for some interesting discussion.

Mr. O'Brien, in your testimony you refer to the International Energy Agency's scenario for universal energy access, which has 65 percent of the energy coming from renewable sources. The model for the electricity sector in the developed world, large-scale central generation with power delivered to customers over a network of transmission and electrical lines, is about a century old. OPIC and the Ex-Im Bank have been operating for years without any energy cap, and these countries have had access to the technologies that make up this traditional generation and delivery system for years. This model hasn't delivered for these people, so this doesn't seem to be a realistic model for energy access by the poor, especially in rural areas. Would you agree with that statement?

Mr. O'BRIEN. Yes.

Mr. TONKO. And the finance model for our electricity sector where central generation and delivery costs are paid by the ratepayers also doesn't seem realistic for people who operate in a cash or barter economy and spend about 75 percent of their incomes on food. Would you agree with that?

Mr. O'BRIEN. Yes.

Mr. TONKO. It seems to me this is analogous to the situation with landline-based telecommunications versus cellular communications, that the improvements in renewable energy technologies and the drop in the price to acquire them seems to have been done far more to improve energy access for poor people in developing countries than our decades-long attempt to help them duplicate our model of energy access. Is that—

Mr. O'BRIEN. Yes. I had the privilege of being in both Africa and Afghanistan to watch the technology leap in the telecom sector, and it was transformative and it wasn't done by starting from all technologies. I couldn't agree with you more.

Mr. TONKO. Thank you. And your testimony provides examples of climate impacts that poor communities in the developing nations are experiencing now. Are these communities or their national governments able to respond to natural disasters, increased water scarcity, or other climate-related problems that they are experiencing?

Mr. O'BRIEN. The short answer is they have to be because there is no other viable way to meet the long-term solutions. If we want

those free market economies with proper oversight, you have got to have effective governments doing that.

When we went to Haiti to help them after the earthquake, only 1 percent of all the money we provided to Haiti went through public institutions and basically left them just as weak afterwards as they were beforehand. You know that Haiti is going to see another climate-related disaster in the next few years, and their government is no more ready today than it was before the last crisis. We have got to find a way both to meet the needs of people on the ground and to do it in a way that makes local institutions stronger at being responsible themselves.

Mr. TONKO. Thank you. And what do these continued or accelerated climate impacts mean for the people affected?

Mr. O'BRIEN. Well, it means everything. It means jobs, too, for fishermen, for farmers, for healthcare workers. We are witnessing threats to livelihood in that all of these contexts because of extreme weather events, and not is why we are so seized with the fact that we have to address both the climate challenges economically and the energy challenges.

Mr. TONKO. Thank you, Mr. O'Brien. Mr. Chair, I yield back.

Mr. WHITFIELD. Thank you.

At this time I recognize the gentleman from West Virginia, Mr. McKinley, for 5 minutes.

Mr. MCKINLEY. Thank you, Mr. Chairman.

Mr. O'Brien, in your testimony you use quite a few statistics and some facts there but you didn't provide the sources of those so that we could verify that. I think it is on page 3 you talk about—you use a 20 time multiplier. You talked about the 3 percent with the poorest people—could you—

Mr. O'BRIEN. Yes.

Mr. MCKINLEY [continuing]. Go back through your testimony and provide us the references of those if you would, please?

Mr. O'BRIEN. We will be happy to do that.

Mr. MCKINLEY. But that leads me to another because what I heard in your comments, you raise, quite frankly, a moral question. I think everyone on the panel and others would agree that the African nation needs affordable and dependable energy for them to emerge from poverty. And there is a consensus among economists that the best way to do that is using their fossil fuels that either they have or they can develop with that. But by virtue of some of your testimony, it came across that these Africans and other people in Third World nations—it comes across as they shouldn't be entitled to use them. Now, America can, but they can't.

And so there was a quote that was given. It was, you know, forcing a Third World person to stay behind by forcing him to use more expensive electricity just so some First World person will feel better about themselves. This comes across as immoral and I am troubled with that, and I hope that we can work together somehow to get across to maybe change the minds of some individuals with that.

But the time that I have remaining I would like to hear a little bit of Mr. Moss because you were also providing some very interesting testimony. I started talking about Africa a year ago, the problems that they have with a lack of power and how we can be

exporting coal into Africa to develop so that they can emerge from poverty. Then I used the model of a 60 watt light bulb and I said that is the total power that they have there is a 60 watt light bulb for 3 hours a day per person. That is it.

So I want you to amplify a little bit more on that and also to reflect back on some of Mr. O'Brien's testimony if you would, please.

Mr. MOSS. Sure. I mean I think that it is absolutely right that the poorest people in the world are going to be hit the hardest by climate change, but it is perverse to actually make the world's poor pay twice by compounding their poverty by taking measures that effectively deny them access to power.

There is no plausible scenario that I have ever seen where African carbon emissions are going to affect global emissions, so if it is a global problem, the problem is in the current emitting countries; it is not—you know, us denying Ghana two or three natural gas power plants is going to have absolutely zero affect globally. So it doesn't make sense to try to connect Ghanaian farmers who are having trouble with climate change and saying, well, let's not let Ghanaian farmers get electricity from Ghana's natural gas. That is just a logical leap that I think is quite frankly quite immoral.

Just one other point I want to make, the IEA figures, the International Energy Agency, when they define energy access, it is for an urban household of five people, 500 kilowatt hours per year. That is 100 kilowatt hours per person. That is what an American will use in 3 days.

So when you see these scenarios that we can provide universal energy access through, you know, nice solar panels, yes, some clinics will run on solar panels, yes, micro-hydro and other technologies are changing every day, but if your target is 3 days' worth of electricity per year for somebody, of course you can do it through these other technologies. And you are not going to be able to build industry, you are not going to be able to have households that run refrigerators and washing machines and all of the things that all consumers want without being able to provide a modern energy system which, given current economics, frankly is going to have to be a mix, including a lot of fossil fuels in many places.

And it is true that the price of renewable technology is coming down. If it turns out that renewables are cheaper in Ghana or Kenya or Mozambique, then the regulations on something like OPIC are totally irrelevant because OPIC is going to decide project by project on what is commercially viable. That is how they do it.

Mr. MCKINLEY. Thank you. I yield back.

Mr. WHITFIELD. The gentleman's time is expired.

At this time I recognize the gentlelady from Florida, Ms. Castor.

Ms. CASTOR. Well, thank you, Mr. Chairman, and thank you very much to the panel. I think this is a very interesting topic and we have many challenges ahead.

Affordable, reliable electricity is very important to our neighbors back home and to the overall economy, and one way that States and utilities help ensure that electricity costs are affordable is by a going through planning processes routinely where they look at the economics of generation and conservation over the long-term and then compare different options. And I know you all agree that

if utilities do not adequately prepare for the future, this can impose substantial cost on the electricity system and its customers.

But it seems now that these planning processes now do not meet the challenges that we face due to the changing climate. They seem divorced from the context of rising costs, from extreme event. I know one of my colleagues said that those costs are often subjective, but they are real and local governments have to adapt, have to address rising sea level rise, but in our local property tax dollars to repair, replace infrastructure systems at home. And look at what the Congress has to do when it comes to disaster funding, responding to natural disasters. It has been a very high price tag that is very well documented.

It seems that part of this is because the whole business model of electricity sales is outdated. There need to be new incentives for the utilities to promote conservation and energy efficiency. And some States are doing that and some are way behind. My State of Florida is kind of a problem child and needs to do more when it comes to efficiency and conservation.

Mr. Biewald, you know, your group has done a lot of the analysis on these planning processes. Most State electric utility planning processes really don't take into account the wider range of cost. One Florida utility Commissioner recently said to me in a conversation, gosh, our hands are tied. The State law was written some time ago. We can't consider any of these cost factors outside of just that narrow ratepayer or rate increase decision. What needs to happen today in the planning processes at the State level for States to begin to build in consideration of the huge costs that we are going to face in the future due to the changing climate?

Mr. BIEWALD. So I would start out by pointing out Florida is one of the more vulnerable States in terms of those damages, right, the storms and the impacts of climate change. We tallied up the damages for scenarios with sea level rise in Florida, and they are, I will say, astronomical in terms of the regulation of utilities in Florida.

I think that the regulators in many States—you have to look State by State—but in many States they have more leeway they may take advantage of. In other words, regulators should certainly be requiring test practices in integrated resource planning, and those practices include carbon price or carbon constraint on the planning of the utilities as they are picking their resources and looking at a full range of resource options, really looking at energy efficiency, really looking at renewables.

Some States now have laws that require the procurement of all cost-effective energy efficiency, and that is a terrific thing. It is basically in the interest of the customers and the businesses in that State. It has environmental benefits but also economic benefits locally. So where we see things like that happening, it helps the commissions and the utilities.

Ms. CASTOR. Do you agree this whole business model on the amount of energy you sell really is not going to service well in the future? Think about the cost that ratepayers and consumers could realize if utilities are aggressive about conservation and energy efficiency. And there is one huge example out of Florida—I know you all are aware of it—where we have put in an advanced recovery fee that kind of encourages the building of large power plants. Unfor-

unately, the plants did not come online but ratepayers were still on the hook to the tune of \$3 billion without realizing one kilowatt hour of energy. Certainly, if a more enlightened business decision had been made, that \$3 billion could go to more energy-efficient initiatives. What do you think?

Mr. BIEWALD. Absolutely. I think there is a lot of improvement that could be made within the current legal and regulatory structures and then also the utility business model and the regulated monopoly. The regulation, the way it is done, is very stressed and needs to be changed. And I think that will be changed going forward on a kind of State-by-State basis as States experiment and learn—

Ms. CASTOR. What can we do at the Federal level to encourage it?

Mr. BIEWALD. Well, at the Federal level I think the main thing is clarity of the coming regulations. So, in other words, utilities in these planning processes in the States, some of them do a good job at anticipating the future fossil fuel prices, future environmental regulations of various types. Other utilities take a very myopic view. They look at the next regulation and ignore the further regulations that are going to come 4 years—

Ms. CASTOR. Yes.

Mr. BIEWALD [continuing]. Six years from now. So as regulations are firmed up so there is some certainty of what is actually coming in terms of carbon and cooling water and air regulations, that helps the utilities and the regulators be able to plan in a rational way and actually pick the lower-cost alternatives. What no one wants is this piecemealing of complying with just the next regulation, then the next regulation, then the next regulation one at a time, which leads to horrendous resource decisions, very expensive investments as you pointed out, that hurt the residential customers, hurts the industrial customers, hurts the local economy.

Mr. WHITFIELD. The gentlelady's time is expired.

At this time I recognize the gentleman from Kansas, Mr. Pompeo, for 5 minutes.

Mr. POMPEO. Great. Thank you, Mr. Chairman.

You know, we heard from some folks on the other side today the Republicans aren't interested in solutions. You know, what we are really interested in is the EPA has proposed solutions that simply don't work. I asked Ms. McCarthy a few weeks back now about the 26 indicators she has got on the EPA Web site about climate change, and I asked what the greenhouse gas regulations would do to each of those 26 indicators. And she said, well, you are thinking about it wrong. This is about global leadership. This isn't about actually impacting climate change. This is about feeling good about ourselves.

You know, Republicans don't care about science? Science is about testable propositions, right? You satisfy the regulations and this is the impact we would expect this would have on climate change, and then you test against that. And yet the very test that is being proposed by the EPA, the administrator herself admits doesn't work.

And so I think this is all about science. I think it is about finding real good solutions, solutions that work. And, Mr. Coleman, that is

why I wanted to ask you a question. So you talked about we have got a greenhouse gas set of rules that are proposed for future coal power plants to be built and you expressed some concern that they may begin to regulate current coal-fired power plant generation as well. How long before the impact of just the rules on new power plants will begin to be felt in the cost structure?

Mr. COLEMAN. Well, I think you are feeling them right now. I was fortunate enough to be able to speak to the EPA back in the summer about this. You know, we are seeing and we are projecting rates that are going to be again somewhere around 40 percent, 20 to 40 percent range for our members when we see some of these come into effect now. You know, that is up to \$480 a year, and that is not a lot to us, but to the ladies, the grandmothers that I have got on fixed incomes, when you talk about these coal-fired plants, whether it is the existing fleet or whether it is the new fleet, it is going to have a tremendous negative impact on my members.

And, you know, I can give you one example. I had a grandmother call me a few years back when we had—we have a fuel cost line adder on our bill and this fuel cost rise that is passed along to the member because that is the only person that can pay these fuel costs. But I had a grandmother from Horseshoe Bend, Arkansas, called me. Typically, this would be a phone call where she was not happy and I might get chewed on just a little bit, but she told me, she said I want you to know that I have figured out—I got this phone call, by the way, this is not someone handing me a note. She said I want you to know that I have figured out how to pay my electric bill; I am going to take my medication every other day. This was several years back. That was when that lady's electric bill was lower than it is today, and what really scares me is all this stuff we are talking about, how is she going to afford it?

I got a text last night from a member who cannot pay her electric bill, and she is a young person and she is worried about not being able to afford air-conditioning in the summer because of what her winter bills have been because of the extreme winter. This is what I face every day.

Mr. POMPEO. Yes, I appreciate that, real health effects of these regulations impacting folks adversely as opposed to what the proponents of these rules would say they are going to improve the health of citizens in Arkansas and places like south-central Kansas.

Mr. COLEMAN. Exactly. Exactly.

Mr. POMPEO. Thank you.

Mr. Biewald, you said in your testimony that in a strip South Dakota and south—that would be Kansas, straight south of South Dakota if I got my geography right—you said wind is cheaper than other forms of energy today. Is that your testimony?

Mr. BIEWALD. In many parts of the country, yes.

Mr. POMPEO. So if it is cheaper today, no need for the wind production tax credit any longer? That is a vestige of days gone by, an anachronism because we now have affordable wind energy at least in this strip? We will have it in other places but the production tax credit for producers in those places, we should just eliminate immediately? That would make sense, right? Just let the market sort it out because they are cheaper today?

Mr. BIEWALD. I think we should look at energy subsidies kind of comprehensively.

Mr. POMPEO. I agree with you but I am just asking the question. One of the justifications for the wind production tax credit you have to subsidize it while the technology improves so the costs could come down, and I just heard you say we are there.

Mr. BIEWALD. I think there are parts of the country where that is the case for wind. There are other—

Mr. POMPEO. And I thank you for supporting me in that effort to get rid of all of those energy tax credits, for the oil and gas guys, too. I think we should get rid of them all. But it sounds like wind is at the competitive point from your perspective in at least certain places.

I was also interested—I have just got 20 seconds left—you talked about companies pricing carbon today in anticipation of regulations down the road.

Mr. BIEWALD. I did.

Mr. POMPEO. So just the mere threat of regulation is driving up costs for consumers today, is that right?

Mr. BIEWALD. Not at all. It is providing a signal where the smart utilities that are looking forward doing long-term planning are able to make better resource decisions. I would say it is lowering costs again in many parts of the country.

Mr. POMPEO. Wow. So it is lowering costs for them to anticipate some future cost increase on their business? Having been a small businessman for a long time, that is fascinating economic estimation.

Mr. BIEWALD. I also am a small businessman.

Mr. POMPEO. Yes.

Mr. BIEWALD. We try to do good planning.

Mr. POMPEO. Fascinating. I will yield back.

Mr. WHITFIELD. At this time I recognize the gentleman from Texas, Mr. Green, for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman, and thank you for holding the hearing.

Today's hearing we are discussing the topic of electricity production and climate change. We have heard from our witnesses that discussed domestic international opportunities and challenges associated with energy access, but underlying all these opportunities and challenge is the economic cost.

You know, the cost associated with natural resources, regulation, production, carbon has created vast amounts of uncertainty for consumers, investors, industry, and the environment, and it is this uncertainty that Congress should address. We must create a workable structure that deals with uncertainty and the framework must remove these unknown variables and address environmental concerns and promote economic development.

Saying all that, I have some questions. Mr. Biewald, your organization produced a document, 2013 carbon dioxide price forecast, that discusses a number of different ways to price carbon. Under the social cost of carbon, the price of carbon is \$23-\$37, industry internally priced carbon at \$6-\$60, which is a great spread, and regional cap-and-trade prices range from \$2-\$11. First, what accounts for these wide disparities? Are they all using different formulas?

Mr. BIEWALD. Well, they are to some extent different things. And one of the questions I answered earlier had to do with the price of carbon in terms of compliance versus the social cost of carbon.

Mr. GREEN. Um-hum.

Mr. BIEWALD. So the social cost, those higher numbers are associated with the damages imposed on people outside of the system from the emissions. The median numbers I believe that you referred to have to do typically with the cost of compliance. So the marginal price if you had a cap-and-trade system comprehensive for the country, this is where the price might be, the kind of prices that I showed where utilities are anticipating the cost. And in the lower numbers are for some of the cap-and-trade systems in place today.

Mr. GREEN. OK. I represent a very industrial district in Houston—refineries, chemical plants—and I know the issue with EPA now is looking at new power generation plants. We know that carbon emitted from a coal plant—in Texas we use everything, coal, natural gas. I don't think we use fuel oil but in a lot of our rural areas we use propane.

But on the cost of fuel switching is a good example, and I want to ask from our co-op in Arkansas, because your base fuel is coal, and I know Arkansas traditionally has produced natural gas and we are seeing some very low prices except for the last month when we have had such—although my producers obviously like the \$5 or \$6 but we don't think it will stay there. What would be the carbon cost, for example, if you used your baseload in Arkansas, you used natural gas instead of coal? What would it cost? Is coal that much cheaper than a pipeline from, say, South Texas to be able to fuel switch to natural gas?

Mr. COLEMAN. Yes, sir. Coal is our least-cost resource. The existing coal fleet that we have, when you exclude the Turk plant that you are well aware of, is about 2.3, 2.4 cents. You get up in the gas range, you are going to be up in that 4 cents a kilowatt hour on a wholesale basis. Now, again, my disclaimer here is I am a distribution guy, but obviously I keep up with our generation resources.

Mr. GREEN. Um-hum.

Mr. COLEMAN. But, yes, natural gas is more expensive. And what worries me is what happens when the next debate moves on to natural gas because of its carbon emissions?

Mr. GREEN. Well, and that is the issue, but unless scientists are changing their opinions, we know carbon would be about half—

Mr. COLEMAN. Right.

Mr. GREEN [continuing]. What it would be for coal.

But that is where I get back to the cost. You know, the ratepayers are going to end up paying for that cost.

Mr. COLEMAN. Yes, sir.

Mr. GREEN. If we see, you know, people really do want to deal with carbon, then we need to make sure that the ratepayers understand there is a cost of doing that. And although I have to admit that in Texas we also produce more wind power than everywhere else in the country. And it is cheap.

And, in fact, ERCOT in our recent problem with reliability said if we hadn't had that 10,000 megawatts of wind power, we would

have probably had rolling blackouts through Texas. And if in Texas we are lacking energy electricity production, no telling what the rest of the country is because we use, like I said, everything except for hydropower. We just don't have enough rivers that have any fall to be able to deal with hydropower.

Mr. Chairman, I know I am out of my time but I appreciate our—because that is the issue, the cost and how much both our customers, your grandmother but also your industry in Arkansas, can afford to be there. And with natural gas we are seeing expansion of a lot of plant capacities as it is cheaper. Thank you.

Mr. WHITFIELD. Thank you. And at this time I recognize the gentleman from Illinois, Mr. Kinzinger, for 5 minutes.

Mr. KINZINGER. Thank you, Mr. Chairman. I was in microphone no man's land, so I will move here.

I appreciate you bringing this hearing together in order to focus on the benefits of having access to affordable and reliable electricity. Not only do individual households reap the benefit of our country's vast energy resources on a daily basis but so does our economy. The industrial sector in the United States accounts for about one-third of all in-use energy consumption while filling about 14 percent of our GDP. What this means is that access to our country's affordable and reliable energy puts domestic production and employment in the manufacturing industry at a competitive advantage as compared to others around the world.

In fact, I had an interesting meeting recently in Germany in which many of the German CEOs informed me of that very fact and the much better competitive environment here in the United States than even in Europe. Low-input prices tend to lead to higher output that can in turn lower prices for consumers. Lower prices lead to less demand for imported products and help create jobs domestically, which are all good things.

In Illinois, over 90 percent of our electricity generation comes from nuclear and coal-powered plants, which seem to both be under constant regulatory threats to their existence. In my district alone, I have four nuclear power plants providing grid and price stability to consumers throughout our region. I believe I have the most of any Congressman out there. Without the availability of this baseload power, there is no doubt that energy prices would skyrocket and the stability of the energy grid would plummet. Not only would this be bad for households, but it also creates an environment in which manufacturers will have to deal with yet another hurdle in order to compete in a global market.

Unfortunately, as is often the case, government regulations have set up roadblocks to this sector of the energy industry. In just the past 5 years, five nuclear power plants have either retired or announced their plans to retire in the near future. And that is baseload power that is critical to the reliability of the system that, unlike some other forms of power generation, we can't just flip a switch to turn back on.

In addition to this, a large portion of nuclear industry is getting to the end of their current licensing lifespans. As it currently stands, existing operating licenses for over 7,500 megawatts of capacity are scheduled to expire before 2023. Two of those reactors are in my district in Illinois. This threat of closure due to reli-

censing requirements is real and is something that I believe we should all take very seriously.

The Foreign Affairs Committee, which I also sit on, just held a markup on the Electrify Africa Act, and I believe Dr. Moss mentioned that in his opening statement. It is bipartisan legislation that states it is U.S. policy to encourage access to electricity through the development of a multi-year strategy to assist countries throughout that region.

I actually recently visited Liberia and I saw the stark contrast between those in Liberia and how they live and those in the United States. And because it was a country that chewed itself up with civil war, you have basically a lost generation, a lost decade. And in many cases, though, I think there is hope for Liberia in the future. It is sometimes hard to find because of what happens.

So, Dr. Moss, my first question is for you. What is a level of electricity that we would consider meaningful access for the poor in Africa and other nations, and is it enough to power a few light bulbs for each person through the year or to provide such necessary for people to have refrigeration, sanitation, efficient water delivery, things like that?

Mr. MOSS. Yes. I think, you know, the international standard of 100 kilowatt hours per year or, in rural areas, 50 kilowatt hours per year is way too low. It is kind of the equivalent of the international standard for poverty of \$1 a day. If you got everybody up to \$1.50 a day, you wouldn't call them rich and they certainly wouldn't be satisfied with that income.

The exact level, probably something closer to 4,000, 5,000 kilowatt hours per year would be a better international standard that would, you know, provide a dignified life that people could use the appliances that in Europe, the United States, and other developed parts of the world that we take for granted.

Mr. KINZINGER. Well, thanks. And I think it is interesting, too, if you actually look at the advances that Africa has made, I mean, you know, back in the '80s and '90s we were constantly seeing videos of people on the edge of starvation. And that number of people on the edge of starvation has reduced but we still have a huge poverty problem obviously in Africa. And when you deny people energy, you deny them opportunity to be entrepreneurs, to build businesses, and to grow themselves out of that situation.

How far do we have to go to get to a point where the poorest of Africa have access on the order of, say, Great Britain or China? Obviously very far.

Mr. MOSS. I don't want to look into a crystal ball on that. I would say that, you know, there is decades of investment have to come and it is both at the consumer level for individuals.

And I should add that the analogy to cell phones and being able to leapfrog cell phones, until we can project electricity through the air, the actual lesson from cell phones is that the commerce can be based on mobile phone payment systems. I was not that long ago in Namibia and they have a pay-as-you-go scratch card for electricity, and being able to do that allows for people to pay for their electricity, which is necessary for commercial sustainability. And we have seen from cell phones that even poor people are willing to

pay for services if they work. So I think there is a lot potential there.

Mr. KINZINGER. Thank you. And as I wrap up, I will just say, you know, I think developing an electrical grid in Africa is important to help them withstand weather disasters, to reduce the need for U.S. and foreign aid, and obviously help us to live in a much better, peaceful world.

Mr. Chairman, thank you.

Mr. WHITFIELD. At this time I recognize the gentleman from Texas, Mr. Olson, for 5 minutes.

Mr. OLSON. I thank the chair, and welcome to our witnesses.

On January 10, 1901, the Spindletop well near Beaumont, Texas, started gushing oil. My home State, Texas, rightfully became the face of oil in America. About a century later, that face has changed. We are still the face of oil, we are the face of coal, the face of natural gas, the face of nuclear power, the face of solar power, the face of wind power. As my colleague Gene Green mentioned, we are the number one wind producer in America right now. We have a true diversified energy portfolio which has allowed my State to become the fastest-growing State in the country. Three million people moved to Texas between 2000 and 2010.

But that growth is being threatened. The administration is conducting a war on coal. Nuclear power here in America is on hold, and tax credits for wind have put our baseload power under pressure. Our grid's reliability is uncertain in the future in many ways.

My first question is for you, Mr. Coleman. And I know that Arkansas is different from Texas, but can you please go into more detail on why wind is an important source but not one that we can build a grid around?

Mr. COLEMAN. And you said wind, sir?

Mr. OLSON. Wind, sir, yes, sir. Again, we are number one but we can't build a grid around that.

Mr. COLEMAN. Well, we can't build a grid around anything in my opinion except baseload generation. You know, we do have wind assets, and when the wind blows, we have those assets, the peaking power that they provide. But I am unable to meet the obligation that I have to serve my members if Arkansas Electric Cooperative has to base their portfolio around wind. We have to have the baseload generation. If I have learned anything in the last few months, Lord hope I have learned something because we have had a tough winter in Arkansas. I don't know how Texas has been but Arkansas has had a tough winter. We have got more to come. But our baseload coal generation is our hedge against the volatilities that we see of natural gas, of the ineffectiveness of wind and solar.

But we cannot, as you said, base our portfolio around wind technology. We will utilize it. It will be part of the mix. The mix does matter and it is an all-of-the-above strategy, just as you mentioned Texas has.

Mr. OLSON. Yes, sir. Thank you.

The next question is to you, Dr. Moss. And first of all, having a 13-year-old son who will be 14 in April, your boy is amazing, but I know he is getting very hungry right now so my questions will be very brief.

I want to talk about India. As you know, over 1 billion people call India home. Over 400 million live in poverty, no electricity. That is more than the entire population of America. And I saw this firsthand. I went on a trip before Christmas. Wealth and poverty, opulence next to staggering poverty, right side by side.

You said that allowing OPIC to invest in gas plants would bring electricity to 60 million more people focusing on renewables alone. I want to get this straight. You said that allowing OPIC to invest in gas plants would bring electricity to 60 million more people than focusing on renewables alone.

And while Chairman Emeritus Dingell is leaving us, his examples persist. I will ask you some yes-or-no questions and get your son to have his lunch here. Are those 60 million people more likely to face illness and see higher child mortality, more deaths, those 60 million people, without getting that power? Yes or no?

Mr. MOSS. Without getting power, yes.

Mr. OLSON. Yes, OK. Yes or no, are they more likely to remain on crude sources of heat and power than dirtier inefficient sources?

Mr. MOSS. Yes.

Mr. OLSON. Yes. Are they more likely to stay in severe poverty?

Mr. MOSS. Yes.

Mr. OLSON. Regarding India, is there any downside to exporting LNG, liquified natural gas, to India in your opinion?

Mr. MOSS. Downside for the United States?

Mr. OLSON. Downside for the United States, India, anybody in the world, big picture.

Mr. MOSS. I don't think.

Mr. OLSON. No downside. One final question: Do you believe that current American policies on power in the developing world would leave people in the dark who would otherwise see electrification? And you can elaborate on that one.

Mr. MOSS. Yes, it will. I mean, it depends a lot on what happens with a lot of the regulations or changing the fiscal year 2014 Appropriations Bill. So it will depend a lot on what happens next year.

Mr. OLSON. OK. That is all my questions. It is time for lunch.

Mr. WHITFIELD. Enjoy your lunch, Mr. Olson.

At this time, I would like to recognize the gentleman from Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. He thought he was last. He forgot about me.

Thank you all for being here. This is important. I will tell you that several years ago, then-Administrator of the EPA Lisa Jackson was in. We were debating the authority to regulate greenhouse gases. Obviously, the case of *Massachusetts v. EPA* set up the principle that they could. It didn't say that they had to. It just said they could if they found that it was harmful from a health standpoint. I asked her at that point, I said, "OK"—I was last then, also—"Your testimony here today has all been about global warming and how hotter temperatures cause people to have more heart attacks and strokes, but what happens when somebody like people in my district cannot afford to pay their bill, cannot afford to buy their fuel? The cost has gone up too high for their electricity, and they cannot heat their home in the wintertime. Did you all study that?" I asked her that question. Her response to me at that time

was—and I may be paraphrasing but pretty darn close—was, “We have programs to take care of those people.”

Mr. Coleman and Chairman Finley, I ask you, when you hear these stories of people who are not taking their medications or you hear stories of people who can't pay their bill, are there always programs to take care of those people or does the money run out like it sometimes does in my district in a hard winter by the time you get to the end of February?

Mr. COLEMAN. The money runs out.

Mr. GRIFFITH. Chairman Finley?

Mr. FINLEY. We do the best we can to have support for people who can't pay, but for many there is not enough money there.

Mr. GRIFFITH. And so, you know, I have to question the underlying finding by the EPA that they have the authority to regulate these greenhouse gases because they studied half of the problem, the rising temperature, but they never looked at what happens when you make those costs go up for the poor people in our country, for the working folks, for the middle class.

I think your testimony—and I apologize I wasn't here; I was at another hearing—but one of you, I think, testified that your constituents or the people that you serve—I guess it was you, Mr. Coleman, have an average household income of about \$32,000. My district might be a couple thousand dollars different than yours, but I am in the same boat with the people that I represent, and they can't always afford to pay these things. We didn't look at that. We didn't look at, apparently, what happens when people can't afford to pay for their medication and to heat their homes. And so as a result of that, I think that the policies the EPA is putting forward are actually harming the health of a lot of American citizens, and it is unfortunate they didn't take the whole picture into account.

And the testimony today here, hearing you all testify and knowing that your testimony is heart-wrenching, I understand that because my constituents tell me the same thing.

Let's talk about, Mr. Coleman, you said the volatility of natural gas, this winter there have been a lot of places. Did you all have any difficulty getting a hold of the natural gas necessary to power whatever plants you have using natural gas?

Mr. COLEMAN. We didn't have any difficulty but at one time some of the prices that we saw—you know, we were in the \$3-\$4 range. We saw prices \$17, \$18 that spiked. Prices on average were \$4 or \$5.

Mr. GRIFFITH. Yes. And I saw reports in the Northeast where they were having trouble getting supply that prices actually crested over \$100—

Mr. COLEMAN. Yes.

Mr. GRIFFITH [continuing]. During that really bad cold snap. That doesn't happen obviously with coal. You have got it piled up out back. You can just pull it in there.

We do have some infrastructure issues with turning it all over to natural gas. Now, in my area, I heard one of the other witnesses or one of the other Congressmen say that they didn't use a lot of fuel oil in their area, but in my area a lot of people use fuel oil and we do at my house. And one of the reasons we use fuel oil is be-

cause we would kind of like to switch to natural gas but there is no pipe that comes to our house. I live just on the other side of the interstate, and it is just too costly to bring that pipe across the Interstate 81 to my neighborhood so I don't have the ability to get natural gas. I might be able to get propane. Do you find that to be a problem for some of the folks in North Carolina, Chairman Finley?

Mr. FINLEY. Yes, sir, it is a problem. We have done a good job, I think, in expanding the pipeline facility. Twelve years ago I was in your situation in the middle of Raleigh. My old 40-year-old oil furnace went out on the coldest day of the winter and the pipeline was about 20 yards up the street, and they couldn't get it there for 3 weeks and I couldn't wait for 3 weeks so I had to put an oil furnace back in.

Mr. GRIFFITH. Yes. And so this is a problem that real people, not ivory tower folks at the EPA or even in the halls of Congress, are facing. It is that, you know, natural gas may be the wave of the future, but if you can't get it there, if you don't have the supplies to provide the electricity, to provide the heat for people, they are going to need it. And also the fact that we are raising the costs by creating regulations that are closing down plants and raising the cost of electricity for the average American citizen is harmful to the health of the working people in this country.

Mr. Chairman, I appreciate the opportunity to have this hearing and I yield back.

Mr. FINLEY. I would say, if I might, that from my friends at PSNC that they have run the line down to my house and I do have natural gas now.

Mr. WHITFIELD. You are the chairman, so you have got influence, right?

Well, Mr. Griffith, thank you. And I want to thank you all for coming this morning to testify. We appreciate the insights that all of you provided on a rather vexing issue.

And that will conclude the hearing. I would like to ask unanimous consent to enter into the record the Electric Reliability Coordinating Council's document entitled "What the Cold Snap Tells Us about EPA Carbon Rules," as well as a letter to the EPA we received from the CEOs of five nuclear power plants relating to EPA's pending cooling tower rules and the fact that may cause the premature retirement of a significant portion of the nuclear fleet.

[The information follows:]

What the Cold Snap Tells Us About EPA Carbon Rules

A Paper of the Electric Reliability Coordinating Council

February 24, 2014

On January 8, 2014, the US Environmental Protection Agency (EPA) published in the Federal Register its proposed new source performance standard (NSPS) for new electric generating units. On February 6, 2014, EPA held a public hearing on the proposed rule. Most commentators agree that the rule effectively ends investment in new coal-powered generation, and sharply curtails expected innovations that might keep coal a robust and vital part of the generation mix in the future. As the Agency trains its regulatory authority on the existing fleet in the near future, significant additional retirements are expected on top of those scheduled as a result of implementation of the air toxics rule finalized by EPA in 2012. As labor leaders have recently observed, “compliance with MATS under the EPA’s current timeline would result in the closing of 56 gigawatts of coal-fired generation and the loss of 250,000 jobs.”

Against the EPA’s regulatory backdrop, this winter has unleashed brutally cold temperatures on citizens around the U.S. – teaching our country some hard lessons about the importance of reliable and affordable electricity, and the need for policymakers in Washington to be very careful about limiting the flexibility and diversity of our electricity generation options. The cold snap has sent natural gas prices soaring, resulted in shortages of propane used to heat many homes, and has exposed the fact that without fuel flexibility our country could face serious electricity reliability problems in the future.

Here are some important lessons:

- **The cold snap has threatened electric reliability and exposed weaknesses in relying on some sources of alternative energy.**

The Federal Energy Regulatory Commission (FERC) recently noted that: “Last week, cold temperatures stressed the bulk power system with high loads, increased generator forced outages, and other challenging operating conditions....PJM filed an application with the Commission for a week-long waiver...[which] allowed PJM to engage in unit-specific review of day-ahead plans with the interstate natural gas pipelines to help ensure that adequate supplies of natural gas were available and to confirm unit availability...Wind turbines were also affected by the cold, with some wind turbine models reaching their minimum operating temperatures.”

Also, one energy company CEO explained that: “Our peak demand between 7 and 8 am, which is when the peak is, there was almost no solar available because the sun is not up, so we need to have a system that can address those requirements and be prepared to provide the service our customers expect and the reliability they expect in those periods. That is the beauty of a portfolio.”

- **On-site storage of coal reduces any volatility related to cold snaps.**

Coal-powered generating facilities will frequently have two to three month's supply on hand, making them particularly useful for the increased demand associated with unusually cold weather. By contrast, natural gas facilities rely on a continuous delivery of fuel by pipeline, which can be subject to interruption under the circumstances of high demand.

- **The cold snap has increased awareness of the fact that coal-fired generation is an important part of electric reliability.**

Even in New England, power providers like PSEG had to rely upon remaining coal capacity in order to keep up with demand during the recent cold months:

"One of the last coal-fired power plants in the region is under pressure from energy experts and environmentalists to close down, but owner PSEG says it's too important to shutter. The plant, on Bridgeport Harbor across Long Island Sound and owned by a PSEG subsidiary, no longer is financially viable, according to a report released last week by an independent think tank. The plant has operated heavily through December and January, and power from the plant is available to Long Island on the New England spot energy market via the Cross-Sound cable...PSEG says Bridgeport is "among the cleanest" U.S. coal-fired plants, and is "important to the reliability of the [electric] grid" -- particularly in winter, when the prices of natural gas and heating oil surge."

Of particular note, as leadership at the American Electric Power observed, some 89 percent of the plants slated for retirement by mid-2015 were needed at full capacity during the Polar Vortex:

"Looking at the physical side, when 89% of our coal capacity slated for retirement in mid-2015 is called upon and running, natural gas delivery is challenged and voltage and load reductions are occurring is another reminder that we should carefully plan and design the social safety net, we call the electric grid to meet extreme requirements, not just steady state conditions. We believe the nexus of EPA initiatives, energy market development and security threats, whether physical or cyber is a national security issue."

Similarly, during the initial cold snap in early January, approximately 75% of Southern Company's coal-fired generating units scheduled to be retired were operated; and during the second bout of cold weather a few weeks ago, nearly 90% of the plants that will be retired were used to provide electricity. Also, Luminant brought two coal-fired generating facilities back into operation in Texas to deal with the cold weather, and the Tennessee Valley Authority (TVA) set new records for electricity demand at the same time that nearly 20 of its coal-fired generating facilities are scheduled for retirement.

The bottom line is this: EPA carbon regulations, coupled with other regulations, push the power sector away from an optimal fuel diversity necessary to best protect American consumers, households, small businesses, and communities in the event of severe cold weather. The most recent experience with the Polar Vortex provided a vivid demonstration of this fact. As the EPA seeks to finalize carbon standards, the Agency must take electric reliability fully into account and must listen to interagency, industry and state/local input in earnest.

- **EPA Regulations Are Forcing a Significant Number of Electricity Generating Units into Retirement, Threatening to Make Reliability Problems Much Worse in the Future**

The Energy Information Administration (EIA) recently released their Annual Energy Outlook for 2014, which noted that EPA regulations will cause a “wave of coal-fired generating capacity” by 2016, and that as much as 50 GW of coal-fired generation will be retired by 2021.

As one report in Cleveland recently summarized:

“Columbia Gas of Ohio joined Dominion's conservation call during the second Arctic invasion earlier this week...What's going on? It's a classic tale of unintended consequences, tied to the move away from using coal as an energy source. Facing stringent new federal clean air rules, electric companies have decided not to upgrade old coal-fired power plants. Instead, they have been shutting down or replacing them with new generators that burn clean and cheap natural gas coming from shale. And the pace is expected to increase over the next few years.”

- **This year's cold snap greatly increased natural gas prices, forcing electric generators to turn to emergency expensive supplementary fuel sources, such as jet fuel.**

During the course of recent cold weather, data from the PJM region encompassing New York and New England have shown substantial increase in wholesale market prices as a direct result of spikes in the underlying market price for natural gas. With half of New England reliant upon natural gas, some local utilities have had to run infrequently used turbines on jet fuel to meet demand.

- **The cold snap has stressed the natural gas supply and resulted in propane shortages that threaten the safety and well-being of millions of Americans.**

In turn, as natural gas flows to electric generation at high costs, the incentive to remove natural gas liquids that are necessary for America's propane consumers decreases. As a result, there have been significant propane shortages for consumers in the Midwest, Northeast and Southeast. About 14 million Americans rely on propane for home heating.

The Electric Reliability Coordinating Council is a group of power-generating companies working on commonsense regulatory policy. For more information, please contact Scott Segal at 202-828-5845 or scott.segal@bglip.com

January 24, 2014

The Honorable Regina A. McCarthy
 Administrator
 U.S. Environmental Protection Agency
 William Jefferson Clinton Federal Building
 1200 Pennsylvania Ave., NW
 Washington, DC 20460-0001

Dear Administrator McCarthy:

As follow up to our last meeting with you on the Clean Water Act Section 316(b) rulemaking, this letter highlights the rule's potential implications for nuclear units. Since the rule was proposed in April 2011, three issues have arisen that could trigger the premature retirement of a significant portion of the nuclear fleet. The loss of these units would have significant economic, reliability, and climate change implications. These issues include:

1. Requirements for repowered, replaced, or rebuilt units that could require units to install cooling towers if they undertake nuclear uprates or routine maintenance, including the replacement of turbines and condensers;
2. Language that could be interpreted to require the use of willingness-to-pay surveys to monetize non-use benefits that could result in significantly overstated benefits that justify a decision to install towers; and
3. Overly broad Endangered Species Act (ESA) provisions that could require facilities to cease operation or install cooling towers if a threatened or endangered (T&E) species is located in a water body from which a facility draws water even without evidence of impact to that species.

Our letter to you dated December 20, 2013 outlines these concerns in detail. All three issues remain key areas of concern for the industry and must be resolved in order to preserve the U.S. nuclear fleet. However, the balance of this letter focuses on the potential implication of the ESA provisions, as we understand them, for nuclear units—the largest source of zero carbon electricity generation in the fleet today. We urge EPA to study the unintended impact of these provisions on the nuclear fleet and the clean energy benefits the fleet provides.

First, we believe the Services should conclude the rule is “not likely to adversely affect” T&E species. We agree with EPA’s original finding that the rule does not authorize any actions that could potentially harm T&E species because the rule provides additional protections for species from impingement and entrainment at cooling water intake structures. Moreover, this rule applies to existing sources, and T&E issues have long been evaluated and addressed at each of our facilities as required by the ESA. Facilities that have already undertaken an ESA Section 7 consultation or obtained a Section 10 permit should not be required to revisit these authorizations, and the final rule should make that clear in the regulatory text.

Second, any ESA monitoring and study requirements must be focused on T&E species directly affected by the intake through entrainment or impingement. We understand that the proposed ESA provisions will require permittees to identify listed species that *may* be in the waterbodies from which a facility draws water and *might be* indirectly affected by intake structures, including by potential impacts to their prey. This overly broad approach could be interpreted to require facilities to prove that the facility is not adversely affecting any T&E species present or that may be present. Attempting to prove this negative would be extremely burdensome and potentially impossible. As a result, this approach could lead to the imposition of requirements not specifically included in the ESA, including potentially requiring a facility to cease operations immediately or install cooling towers. Moreover, the approach used to incorporate proposed ESA provisions into the state 316(b) permitting process represents a dramatic departure from the current NRC-initiated Section 7 consultations procedure used for nuclear facilities that involves multiple federal agencies. Having the ESA consultation take place prior to submittal of a state permit application would shift the decision-making to a single federal agency. Rather, any ESA study or consultation should occur as an integral part of the current permitting process and not separately. In summary, the rule, as we understand it, would impose new ESA requirements that are beyond the scope of this rulemaking and that set an untenable precedent for future EPA rulemakings. These new ESA provisions are much more expansive than the current applications of ESA in the existing NPDES permitting process and are not supported by court decisions interpreting the requirements of the ESA.

Ultimately, we are concerned that these new ESA provisions could require owners and operators of cooling water intakes to install cooling towers even if there is no evidence that the facility is causing an adverse impact. Cooling towers are particularly problematic for existing nuclear units because of high retrofit costs associated with safety issues at nuclear plants and space constraints. This is true for nuclear units in competitive and regulated markets. In recent years, the economic conditions in competitive markets have caused the profitability of nuclear units to deteriorate. For example, the precipitous and sustained decline in natural gas prices since 2008 has significantly undermined the economics of nuclear generation by lowering the market price for energy. In Eastern PJM, the profitability of nuclear units (after accounting for normal operating and maintenance costs) has fallen to levels comparable to those realized by natural gas fired combined cycle generators. These economics tend to favor construction of new natural gas facilities compared to making large capital investments in existing nuclear plants. In fact, the North American Electric Reliability Corporation (NERC) concluded in a 2011 report that most nuclear units facing an obligation to install cooling towers would retire, and that 25 to 39 GW of electric generating capacity could be economically vulnerable to retirement as a result of a 316(b) rule that imposes closed cycle cooling.¹

Similarly, cooling tower retrofits pose a problem for nuclear units in regulated states where retrofits are limited to what the public utility commission will approve. There is no certainty that state regulators will determine that investing billions of dollars to retrofit an existing nuclear unit with a cooling tower is the “lowest reasonable cost option” to meet the requirements. Rather,

¹ North American Electric Reliability Corporation, *Potential Impacts of Future Environmental Regulations* (November 2011).

state regulators will likely elect to allow a nuclear unit to shutter and instead approve an investment in a new natural gas combined cycle unit, resulting in higher greenhouse gas emissions.

The retirement of even a small number of nuclear units would have significant reliability and climate change implications. For example, Exelon has decided upon early retirement of its Oyster Creek Generating Station in New Jersey rather than installing uneconomic cooling towers. Assuming that generation from Oyster Creek would be replaced by existing resources in New Jersey, Oyster Creek avoided nearly two million metric tons of CO₂ emissions in 2012 alone.

In Virginia, Dominion's preliminary estimate for retrofitting the Surry Nuclear Power Station with cooling towers is approximately \$3 billion. As the NRC licenses for Surry's two nuclear units expire in 2032 and 2033, it is unlikely that such a significant investment in a facility with a limited remaining useful life will be viewed by Virginia's State Corporation Commission (SCC) as serving the best interests of Dominion's customers. With the long lead time necessary to plan and construct cooling towers coupled with the uncertainty of possible 316(b) ESA requirements and Dominion's obligation to reliably serve its customers' electric power needs, it is highly likely the SCC could reasonably find a new natural gas combined cycle facility to be a more viable option.

Similarly, in California, the Diablo Canyon Power Plant serves about 10 percent of the state's electricity needs with no greenhouse gas emissions. The state is currently implementing its once-through cooling regulations and estimates show that requiring closed-cycle cooling at Diablo Canyon would cost about \$9 billion to \$12 billion, providing a negligible environmental benefit.² State regulators and independent scientists have reviewed Diablo Canyon's impacts on numerous occasions, and all have reached the same conclusion: the facility's low impingement does not warrant any further assessment or action.³

Since October 2012, companies have announced the retirement of five reactors representing nearly 4,200 megawatts. Nuclear currently provides one fifth of the nation's electricity and 62 percent of U.S. clean generation.⁴ Emissions would increase if generation from fossil fuel-fired power plants replaces a large share of the retiring nuclear units' generation. As shown in the attached graphic, if the current pace of nuclear retirements continues, 25 percent of the nuclear fleet would likely retire by 2020. This outcome would cause the U.S. to lose over half of the progress we have made to date toward meeting President Obama's 2020 emission reduction goal of 17 percent of 2005 emissions.

We appreciate the time you and your staff have taken to hear our concerns on this rule, and please do not hesitate to contact us if you have any questions regarding our ESA concerns as

² Bechtel Power Corporation, *Final Technologies Assessment for Alternative Cooling Technologies or Modifications to the Existing Once-Through Cooling System for Diablo Canyon Power Plant (Final Draft)* (September 2013) (PG&E Comments submitted October 2013).

³ See e.g., Tenera, *Diablo Canyon Power Plant 316(b) Demonstration Report* (March 2000), pp. 1-2; Central Coast Regional Water Quality Control Board, Staff Testimony (July 10, 2003), pp. 6-7.

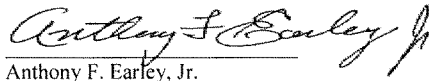
⁴ Energy Information Agency (EIA), Net Generation Data 2003 to June 2013 (Available at: <http://www.eia.gov>).

they relate to nuclear units. We look forward to continuing to work with you to finalize the rule in the coming weeks.

Sincerely,



Christopher M. Crane
President & CEO
Exelon Corp.



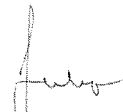
Anthony F. Earley, Jr.
Chairman, President & CEO
PG&E Corp.



Thomas F. Farrell
Chairman, President & CEO
Dominion

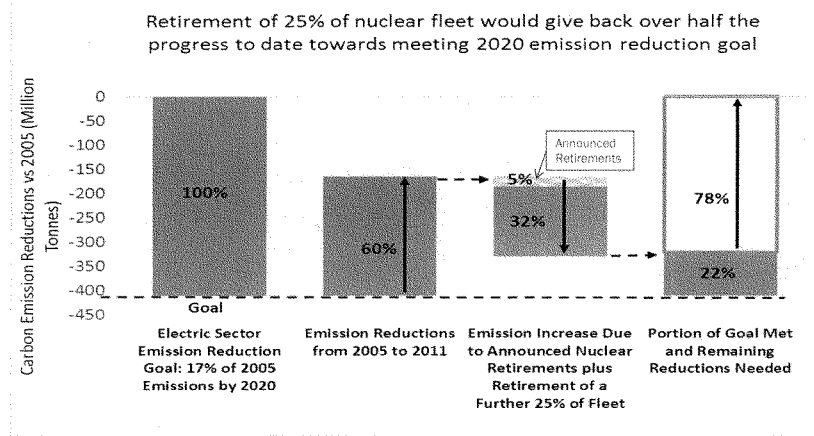


Ralph Izzo
Chairman, President & CEO
Public Service Enterprise Group, Inc.



James L. Robo
Chairman, President & CEO
NextEra Energy, Inc.

Impact on carbon goals without nuclear



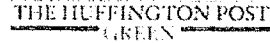
Sources: EIA; Exelon Estimates

Nuclear retirement increase assumes retirement of SONGS, Crystal River, Kewaunee, Vermont Yankee, and Oyster Creek plus 24.6 GW of additional "generic" capacity (29.4 GW total, including the announced retirements). Nuclear output is assumed to displace carbon at a rate of 0.67 tonnes per MWh of lost output.

"[T]he odds seem low that the world can avoid catastrophic warming without carbon-free nuclear power." – *Unavoidable Answer for the Problem of Climate Change*, New York Times (Nov. 2013)

Mr. WHITFIELD. And I want to clarify the fact, when I was talking about Southern Company, I want to make sure that I said 75 percent of Southern Company's coal-fired generating plants scheduled to be retired were operated during the cold spell. And that is like 3,300 megawatts. So those that were scheduled to be retired were operating, and certainly when they are retired, that will be the end of it.

And also ask unanimous consent that we enter into the record "Energy Access and the True Cost of Fossil Fuel Projects in Africa."
[The information follows:]

From


Doug Norlen [Become a fan](#)
 International Expert and Specialist

Daniel M. Kammen, Ph.D. [Become a fan](#)
 Professor of Energy, University of California, Berkeley; ECPA Fellow, U.S. Secretary of State

Energy Access and the True Cost of Fossil Fuel Projects in Africa

Posted: 02/20/2014 11:59 am EST Updated: 02/20/2014 11:59 am EST

Last year President Obama launched Power Africa, an initiative to double access to power in sub-Saharan Africa, where more than two-thirds of the population is without electricity. In a parallel move, the House Foreign Affairs Committee leadership introduced the Electrify Africa Act to encourage access to electricity in sub-Saharan Africa. Since then, there has been quite a bit of debate about how federal agencies can best provide support for sustainable energy access for the region.

On February 10, in the Council on Foreign Relations' Energy, Security and Climate blog, Michael Levi posted a thoughtful piece entitled, "Is U.S. Fossil Fuel Policy Keeping Millions Poor?" This question is critical to not only how to most effectively use overseas investment and development funds, but how to transition the energy system at the household, regional and global levels in a way that addresses the crippling problem of insufficient energy access for the global poor in an environmentally responsible way. This issue is one where we have done a considerable amount of analysis, and the results should be eye-opening to those looking largely retrospectively at the evolution of energy provision and end use technologies and policies.

In the post Levi critiques a January 2014 Center for Global Development (CGD) paper that calls for the weakening of the landmark climate and development policy of the U.S. Government's development finance agency, the Overseas Private Investment Corporation (OPIC). This policy, which requires OPIC to reduce its fossil fuel financing and increase its renewable energy financing, has shifted the agency from providing \$131 million in renewable energy projects in 2009 to now around \$1 billion annually -- roughly 30 percent of total agency financing -- to the developing world. This transition away from fossil fuels to a renewables-intensive portfolio is consistent with both the global imperative to reduce carbon emissions, and the very pressing need that United Nations Secretary General Ban-ki Moon has identified as a crippling issue for the global poor: energy access.

Yet, CGD argues that a revision of OPIC's climate policy is needed to allow more financing for gas projects, and that could somehow result in more than 60 million additional people in poor nations gaining access to electricity generated by those projects.

Levi highlights a number of key issues, and in turn makes a set of important critiques, beginning with the finding that that CGD's analysis is based on dubious assumptions of higher finance leveraging ratios from OPIC support for natural gas projects than for renewables. He notes that:

Historical leverage ratios do not tell us that for every additional dollar OPIC spends on gas the private sector will spend four. They actually tell us nothing about how much private investment a dollar of OPIC spending will leverage, because they don't tell us what happens at the margin, and they don't tell us anything about causality... It's entirely possible that public spending on natural gas projects appears to leverage more private capital than spending on renewables does simply because more private capital is already there for natural gas than for renewables.

Levi also argues that CGD's cost estimates focus on capital costs for plant construction and omit expensive fuel costs for gas plants over time -- a problem that renewable energy does not face.

In fact, the CGD memo contains a number of problematic statements that warrant further exploration, namely:

Obsolete Data: CGD bases much of its cost estimates on a 2008 Congressional Research Service (CRS) report and a 2010 Department of Energy report on U.S. power plant capital costs. However, renewable energy capital costs have plummeted throughout the world since these reports were released. For example, the 2008 CRS estimates that the average cost of installed capacity of selected solar photovoltaic projects is \$6,552 per Kilowatt (or \$6.55 per watt). However, a 2013 report by the Lawrence Berkeley National Laboratory and U.S. Department of Energy demonstrates that by 2012 the median cost of installed photovoltaic projects in the U.S. decreased to between \$4.6 and \$5.3 per watt, and costs for 2013 and beyond are expected to drop still further. In fact, using the U. S. Department of Energy's SunShot objectives of \$1/watt commercial-scale solar by 2020 (a target most analysts believe that the world will hit based on current R&D and market-based policies), we recently found that solar could reasonably provide one-third or more of the energy for much of the United States. Africa is not removed -- in fact it is benefitting greatly on both energy access and price containment -- from this global trend. According to a 2013 market research paper by Deutsche Bank, in South Africa solar energy for residential use is already capable of being deployed cheaper than the current price of electricity from the grid. This finding is consistent with the work of the IFC and U.S. DoE supported Lighting Africa program, which find that even in the short-term, solar beats off-grid and mini-grid based fossil fuels, a

finding our own laboratory at UC Berkeley has confirmed in field-studies in East Africa, southeast Asia and Central America¹.

High Fossil Fuel Operating Costs Over Time: The 2008 CRS report found that the most variable cost for fossil fuel projects is the cost of fuel, since "it takes years to build a power plant, and plants are designed to operate for decades, generation plans largely pivot on fuel price forecasts. However, fuel prices have been notoriously difficult to predict." Also, Levi notes that in Africa the cost of using gas domestically includes forgone gas export revenues. Higher export prices compete with, and can drive up domestic prices, which can be expected in Africa as countries there seek to increase exports. This high variability and lack of predictability should be of great concern in the context of energy access, since lower income communities may likely not have the financial means to pay for fuel when costs fluctuate to high levels. Meanwhile, the CRS study states what is perhaps obvious, that fuel prices are "irrelevant to solar, geothermal and wind power."

Moreover, the high capital cost of large centralized fossil fuel projects typically result in long-term power purchase agreements, thus locking countries into expensive long-term fossil fuel supply contracts, sometimes over two decades, thus forgoing the opportunity to displace more expensive fossil fuel projects with cheaper renewable energy projects as the costs of renewables drop. And, large centralized fossil fuel projects can take several years to construct before generating electricity, while renewable energy can be more quickly deployed and does not saddle poor communities with expensive long term fossil fuel supply costs. According to a Baker McKenzie survey of 140 senior business executives from project developers, bank, investors and service providers:

Renewables [in Africa] can be installed much more rapidly than conventional fossil fuel generation. Solar PV also has a natural advantage over other renewable technologies in that it can be deployed on a relatively small scale -- 85 percent of survey respondents believe that solar PV's suitability for rural, off-grid applications is a strong driver for its installation.

Transmission and Distribution Costs Omitted: By comparing only the capital cost of power plants, CGD omits one of the most crucial costs associated with energy access in Africa -- the cost of transmission and distribution. According to the International Energy Agency's (IEA) report, *Energy for All: Financing Access for the Poor*, of people without access to electricity globally, more than 95 percent are either in sub-Saharan Africa or developing Asia and 84 percent are in rural areas. According to the IEA, due to the high cost of extending the grid to these areas, to achieve universal energy access 70 percent of these rural areas should be connected either with mini-grids or with small, stand-alone off-grid solutions, and that 90 percent of mini-grid and off-grid must be provided by renewables. According to the IEA:

Mini-grids, providing centralized generation at a local level and using a village level network, are a competitive solution in rural areas, and can allow for future demand growth, such as that from income-generating activities.

According to Baker & McKenzie, such small scale renewables "are attractive, being relatively quick and cheap to deploy relative to fossil fuels, making them suitable in areas where there is no grid connection, where they can also compete on cost with conventional energy sources."

Externalized Costs Omitted: CGD correctly states that pollution from the current use of solid fuels used for lighting, heating, and cooking in Africa contributes to health problems including premature deaths. However, CGD omits the fact that fossil fuel power projects that it proposes also cause health problems, including cardiovascular and respiratory illness that likewise contribute to premature deaths. Additional harmful externalities from fossil fuel projects can cause damage to community resources and commons, as well as losses to agricultural productivity.

Through administration, interagency and international efforts, methodologies to calculate the economic costs of these externalities -- called the social cost of carbon -- are increasingly common. These methodologies attempt to estimate economic costs associated with carbon dioxide, as well as other pollutants released simultaneously, such as sulfur dioxide, particulate matter, and mercury. While the tragic human toll from this pollution is never simply monetary, the existence of social cost of carbon methodologies demonstrates that there is increasingly mainstream awareness of the economic costs that fossil fuel projects externalize to the public. The recently revised U.S. Export-Import Bank Guidelines for High Carbon Intensity Projects require that "subsidies and externalities, such as the social cost of carbon emissions, even if not quantified," be included in obligatory assessments to determine whether economically feasible alternatives exist for proposed coal plants in the poorest countries. Environmental and developmental NGOs are urging OPIC to also include the social cost of carbon in its comparisons of all power generation options. However, CGD omits any mention of these externalities in its analysis of fossil fuel versus renewable power plant options. If the goal of increase energy access includes health and environmental considerations, these costs must be factored in.

Installed Capacity Does Not Translate to Energy Access: Perhaps the most startling thing about the CGD analysis is the assumption that increased federal financing for American gas companies doing projects in Africa will result in 60 million poor people in those countries somehow gaining access to the electricity generated by those projects -- despite the lack of a grid that connects them. An independent review of past energy projects at major international development financial institutions since 2008 shows an opposite result -- over \$28 billion to natural gas projects with zero dollars actually targeting energy access for the poor. Meanwhile, the CGD analysis provides no strategy -- much less cost

estimates -- to ensure that access is extended. Foreign investors, seeking the highest profits possible, will naturally gravitate to projects that do not require them to absorb the cost of expensive grid extensions to poor communities. More likely, the CGD approach would result in a shift back to the old days with OPIC clients that pursue polluting centralized fossil fuel projects that will be connected to established grids or that extend to industrial zones or urban areas that can pay for higher costs of electricity -- rather than distributed renewable energy projects that do not require massive grid expansion.

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- 1) Casillas, C. and Kammen, D. M. (2010) "The energy-poverty-climate nexus," *Science*, 330, 1182 - 1182
 - 2) *Insights into the renewable energy sector: A conversation with Lynn Tabernacki, OPIC's managing director of renewable and clean energy programs, The OPIC Blog, October 29, 2012, available here.*
 - 3) Stan Kaplan, "Power Plants: Characteristics and Costs," *Congressional Research Service Report*, November 13, 2008
 - 4) Tidball, Rick, Joel Bluestein, Nick Rodriguez, and Stu Knoke, "Cost and Performance Assumptions for Modeling Electricity Generation Technologies," *National Renewable Energy Laboratory, Department of Energy, November 2010*
 - 5) *Ibid #3 at pg 92*
 - 6) *Tracking the Sun VI: An Historical Summary of the Installed Price of Photovoltaics from 1998 to 2012, Lawrence Berkeley National Laboratory, July 2013, available here.*
 - 7) Mileva, A., Nelson, J. H., Johnston, J., and Kammen, D. M. (2013) "SunShot Solar Power Reduces Costs and Uncertainty in Future Low-Carbon Electricity Systems," *Environmental Science & Technology*, 47 (16), 9053 - 9060
 - 8) *Q2 Preview: Improving Fundamentals, Outlook, Deutsche Bank Market Research: Solar, July 31, 2013, available here.*
 - 9) *Ibid at pg 23-24.*
 - 10) *The Future for Clean Energy in Africa, Baker & McKenzie, June 2013, available here, see also here.*
 - 11) *Energy for All, Financing Access for the Poor, International Energy Agency, October 2011, at pg 3, and pg 21-26.*
 - 12) *The Future for Clean Energy in Africa, Baker & McKenzie, June 2013*
 - 13) *See here.*

Mr. WHITFIELD. So with that, the record will remain open for 10 days.

And we look forward to working with all of you as we move forward, and thank you again for your time. And that will conclude today's hearing.

[Whereupon, at 12:13 p.m., the subcommittee was adjourned.]

