

# RENEWABLE ENERGY: COMPLEMENTARY POLICIES FOR CLIMATE LEGISLATION

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## HEARING BEFORE THE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT OF THE COMMITTEE ON ENERGY AND COMMERCE HOUSE OF REPRESENTATIVES ONE HUNDRED ELEVENTH CONGRESS FIRST SESSION

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## **RENEWABLE ENERGY: COMPLEMENTARY POLICIES FOR CLIMATE LEGISLATION**

**THURSDAY, FEBRUARY 26, 2009**

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

The subcommittee met, pursuant to call, at 9:40 a.m., in Room 2322 of the Rayburn House Office Building, Hon. Edward Markey (chairman) presiding.

Members present: Representatives Markey, Doyle, Inslee, Butterfield, Melancon, Matsui, McNerney, Welch, Dingell, Pallone, Engel, Green, Gonzalez, Baldwin, Matheson, Barrow, Waxman (ex officio), Upton, Hall, Stearns, Whitfield, Shimkus, Blunt, Pitts, Sullivan, Scalise and Barton (ex officio).

Staff present: Matt Weiner, Clerk; Melissa Bez, Professional Staff; John Jimison, Senior Energy Counsel; Jeff Baran, Counsel; Joel Beauvais, Counsel; Lindsay Vidal, Press Assistant; Andrea Spring, Minority Professional Staff; Amanda Mertens Campbell, Minority Counsel; and Garrett Golding, Minority Legislative Analyst.

### **OPENING STATEMENT OF HON. EDWARD J. MARKEY**

Mr. MARKEY. Welcome. Today the Subcommittee on Energy and Environment is going to have a very important hearing because the American people are calling for a clean energy revolution.

According to a December 2008 poll conducted by the Washington Post and ABC News, 84 percent of Americans support requiring utilities to increase their use of wind, solar and other renewable sources of power. In his address to Congress earlier this week, President Obama outlined his vision for a clean energy future that will not only help turn around our ailing economy but also drive new investment and job growth for decades to come. The President called upon Congress to enact cap and invest legislation to slash global warming pollution and spur renewable energy growth, and that is what this committee intends to do.

President Obama has called for 25 percent of our electricity to come from renewable resources by the year 2025. The American Renewable Energy Act, the renewable electricity standard bill that Congressman Platts and I introduced earlier this year, would achieve that goal. Such a standard would create hundreds of thousands of new jobs and can provide an essential pillar of strong energy and climate legislation.

Renewables are already growing fast. In 2008, we installed in the United States over 8,000 megawatts of new wind-generating capacity in the United States, over 40 percent of all new electricity-generating capacity additions in our country. The Department of Energy recently issued a report charting a course to generation of 20 percent of the country's electricity from wind alone by 2030. Study after study has demonstrated the massive potential for solar, biomass, geothermal and incremental hydropower as well. One of the key drivers of the recent surge in renewables has been the growth in State renewable electricity standards. Twenty-eight States and the District of Columbia now have mandatory standards. Those standards cover over half of the country's electrical load and will require the addition of more than 60,000 megawatts of new renewable power by 2025.

Renewables are an engine of job creation. With a single wind turbine containing between 200 and 400 tons of steel, a clean energy economy will reinvigorate our manufacturing sector. Those jobs are going to be done by the same blue-collar workers doing the same kind of work just with new technologies already in communities like Newton, Iowa, where wind blades are now produced by the same blue-collar workers left unemployed when Maytag left town. The manufacturers of renewable energy technologies are located all across the country from LM Glassfiber's wind turbine blade factories in Arkansas, Michigan and North Dakota to First Solar's thin film solar plant in Toledo, Ohio. People are living the renewable energy revolution.

Just as the United States is blessed with great business and technology innovators, it has also been blessed with an abundance of renewable resources. A federal renewable electricity standard will allow us to harness potential from every region of the country from wind across middle America to biomass in the Southeast to solar in the Southwest. Every part of the country can benefit and contribute. A renewable electricity standard and a carbon cap are complementary policies. As a zero-carbon electricity source, renewables will of course contribute to our climate goals but a renewable standard will also spur technology development and job creation immediately, driving renewable energy costs down and domestic green jobs up. If we build a strong domestic renewable energy industry, that will drive economic growth over the coming decades and make it easier for America and the rest of the world to meet declining carbon caps over the long term. At the same time, by lowering demand for natural gas, a renewable standard will deliver major energy savings for consumers while enhancing our energy security and global competitiveness.

This is an important subject for our country. I look forward to our distinguished panel.

I now turn and recognize the ranking member of the committee, the gentleman from Michigan, Mr. Upton.

Mr. UPTON. Well, thank you, Mr. Chairman, and before I begin my statement, I would like to submit for the record an article by Professor Jay Apt, executive director of the Carnegie Mellon Electricity Industry Center. Sadly, Professor Apt was not permitted to testify today to make a couple of important points and observations on the topic. I would like to read two lines from his article that are

very important for us to hear. "Legislation that mandates specified electricity production from renewable sources paves the way to costly mistakes because it excludes other sources that can lead the country's goals. Rather than specifying a winning technology, Congress should specify the goals and provide incentives to reach them." I would ask that the hearing record be left open for the submission of additional statements including my friend, Mr. Burgess, who had to go to another hearing on the Senate side in terms of his opening statement.

Mr. MARKEY. Without objection.

[The statement of Mr. Burgess follows:]

**Committee on Energy and Commerce Hearing, "Renewable Energy:  
Complementary Policies for Climate Legislation"  
Subcommittee on Energy and Environment  
Opening Statement  
February 25, 2009**

Thank you Mr. Chairman,

Call me a home town fan but when it comes to renewable energy, I believe Texas has the right idea. In 1999 the Public Utility Commission of Texas (PUCT) established a renewable portfolio standard (RPS) which called for 2000 megawatts of new renewables to be installed by 2009. 2000 megawatts was installed well before 2009 and in 2005 a new standard was established calling for 10,000 MW by 2025. 28 states have a mandatory RES but Texas is special because we decided that it would be most appropriate to establish a standard based upon the possible potential output instead of an arbitrary percentage based standard.

According to the American Wind Energy Association, in 2007 Texas had the most installed wind energy by capacity with over 2,768 (MW). Last month, the AWEA announced that Texas now has 7,116 (MW) of installed capacity. That's nearly 5000 (MW) more than Iowa, the state with the next most wind capacity. In fact, Texas is capable of producing more wind power than next three high capacity states (Iowa, California, and Minnesota) combined. Despite the strong winds and aggressive actions in Texas, 7,116

(MW) is only 4.9 percent of all energy produced in Texas. And that's the point with mandates. They have the potential to work, but only if they are within the realm of the possible and not arbitrary percentage mandates.

**OPENING STATEMENT OF HON. FRED UPTON**

Mr. UPTON. Today's hearing, "Renewable Energy: Complementary Policies for Climate Legislation", is indeed an important one. I am supportive of renewable energy for many reasons. Primarily it is domestically produced, it helps us achieve energy independence and it is clean, which helps obviously our environment. As policymakers, our goal should be to promote energy independence, keep energy affordable and foster a cleaner environment. It is not appropriate for us to be picking winners or losers. We should support all sources of energy that meet those goals and everything must be on the table, all of the above, as we seek to expand the use of renewable energy.

This month my chairman, Mr. Markey, introduced a renewable electricity mandate. I do support using more renewable electricity but the bill, I think, provides too narrow an approach, only allowing for a few select renewable sources rather than all renewables, and most notably, this bill does not include other forms of emission-free power. Emission-free sources of energy should be at the forefront of any discussion of climate change. It is a glaring omission to not include all forms of emission-free electricity. A renewable-only electricity mandate would effectively be an added tax on electricity and this government mandate would increase prices and hurt consumers by adding increased costs at a time of very dire economic times in our country.

U.S. residential electricity prices already are projected to increase in the coming years and this bill would undoubtedly increase those prices even more at a time when American working families and businesses can least afford it. The federal mandate ignores the standards already crafted by States to meet their specific regional needs. My State, Michigan, has already tailored a renewable plan to mesh with the renewable resources available in our region, and this bill ignores those different regional needs. A one-size-fits-all approach would not be the most effective means to harness the power of renewable sources of energy.

I thought we were trying to focus on reducing carbon dioxide emissions. If we add all clean electricity sources in the Markey bill, the impact on greenhouse gas emissions and energy security would be significant and our air quality and planet as a whole would be much better off. I would in fact support creating a national electricity standard and I would be happy to work with you in crafting a bill that creates a nationwide electricity standard that promotes any form of zero-emission power. That is what we ought to be focusing on, not a narrow renewable mandate that has somewhat minimal environmental impacts and does in fact increase energy prices.

Energy legislation should be inclusive. Let us decide where we want to go and allow the market and all available technologies to get us there. If we are serious about reducing emissions, being energy independent and creating jobs, keeping nuclear off the table is a mistake. In addition to be a zero-emission-based low power source, each nuclear plant employs between 600 and 1,500 folks with an equivalent number of indirect jobs. There are thousands of jobs involved in the construction at these sites and obviously I think it improves our economy as each new plant adds more than

\$500 million a year to the economy. A renewed commitment to nuclear power and the construction of dozens of new plants on American soil will foster the rebirth of the manufacturing industry and the creation of tens of thousands of new high-paying jobs while at the same time reducing emissions.

In conclusion, I am supportive of finding policy options to address climate change but in today's economic and national security environment, we have to be mindful of the impact on our country. Thank you.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the chairman emeritus of the Commerce Committee, the gentleman from Michigan, Mr. Dingell.

#### **OPENING STATEMENT OF HON. JOHN D. DINGELL**

Mr. DINGELL. Mr. Chairman, I thank you for your courtesy and I thank you for holding this important hearing. You are to be commended for building a strong record on this matter and for making a strong case for swift and well-thought-out action on climate change. The title of the hearing speaks for itself. Renewable energy can and should be a complementary policy for climate change, but as I have said for years, it must be well thought out and it must be a real renewable energy standard.

We in Michigan are saddled, as you know, with an extremely depressed economy, and I have to tell you, Mr. Chairman and my colleagues, that we have exactly the kind of workers who can benefit from the jobs created by a strong renewable energy sector. We have some of the best metal workers in the world, who would be delighted to have the opportunity to be in the forefront of these new technologies. I would also point out in Michigan, like in many other States, our State, we have our own renewable standard. Ours is 10 percent by 2015. As we move forward with a national standard, it is important that we take what the States have already done into consideration and that we have a framework then within which they can work. It is also important, as my friend from Michigan has just said, that it is important that we should consider the differences and the peculiarities in the situation of each of the States.

Now, as always, Mr. Chairman, the devil is in the details. For example, it makes a great deal of sense to understand that we should not be putting waste in landfills if when we do so we are taking up space and in the long run we are spewing methane into the atmosphere. This is, as we all know, one of the very greenhouse gases which we need to rein in to effectively address the problem of climate change. So why add to the problem of landfill space and methane gas when we can utilize that waste for energy while still maintaining strong air quality standards.

Finally, I want to stress the importance of an inclusive approach as we move forward with climate change legislation. While we are talking specifically about renewables today, it is my strong belief that any comprehensive climate change legislation needs to include all renewables and indeed other non-greenhouse-gas-emitting technologies.

Mr. Chairman, I thank you for your courtesy. I look forward to hearing from our witnesses today and I yield back the balance of my time.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Texas, Mr. Barton, the ranking member of the full committee.

**OPENING STATEMENT OF HON. JOE BARTON**

Mr. BARTON. Thank you, Mr. Chairman. I think it is important to have a good hearing schedule if we are going to begin to move on this issue of climate change. I commend you and the full committee chairman, Mr. Waxman, for scheduling and notifying that we are going to have a number of these hearings.

The question that I would have today before getting into the substance of the renewable debate is whether you want to have a series of hearings where you only hear one point of view. We have five witnesses today. There is one that has been offered by the Minority, the public utility commissioner from the State of Georgia. We had another witness, a professor from Carnegie Mellon that we did everything except smuggle him in under cover of darkness last night and disguise him as a chair or something in the hearing room to try to get him to testify. He wasn't allowed to because apparently you and/or your staff doesn't think that it is fair to have a broad range of views or more comprehensive range of views on this particular issue. We have had the same problem in every hearing that we have had so far in this subcommittee on this issue, not renewable but just climate change. It is not fair to say you are going to have hearings and then not allow the Minority to have a full complement of alternative views so that we get a fair and balanced hearing record in which to determine what legislative approach, if any, needs to be taken. I know time is of the essence but I don't think one or two additional Minority witnesses is going to slow the process down that much and I am hopeful that in the near future we will come to some agreement so that we can have a full and balanced hearing.

Mr. MARKEY. Would the gentleman yield?

Mr. BARTON. I will be happy to yield.

Mr. MARKEY. The standard which I am using is the standard honestly which was applied to me as the ranking member on the telecommunications committee. I was afforded one witness for each hearing for all those years, and that was deemed to be fair by the Majority at that time, and all I am doing is extending the same courtesy that the Majority, now in the Minority, that was extended to me because that was the precedent that was set and that was the determination that was made with regard to the number of witnesses—

Mr. BARTON. Reclaiming my time.

Mr. MARKEY. —the Minority would have.

Mr. BARTON. Reclaiming my opening statement time, Mr. Chairman. We will go back and get the witness lists from my chairmanship. I am not going to disparage such a distinguished gentleman as yourself and a friend of mine as you are, but that is not my recollection at all. We had hearings in which there were more Minority witnesses than Majority witnesses, and it is just not acceptable to have a witness situation where the preponderance of the witnesses is so overwhelmingly at a philosophical and ideological point of view that it is just not—at a minimum, it is not balanced.

Time will tell about where some of these issues stand up, so I am not going to belabor it but this issue isn't going to go away. I have talked to you about it privately. I have talked to Chairman Waxman about it. We will continue to discuss it as professionals. It is something that can be resolved and that should be resolved, and knowing your personal fairness as a human being, I think it will be resolved.

Mr. MARKEY. I appreciate that. But I think when you go back and you look at the history, you will see that my recollection of—

Mr. BARTON. Well, we will see. The facts are the facts and we ought to be able to recreate the facts from the past. I mean, you can't predict the future but you can at least with some degree of accuracy recreate the past.

With the 1 minute I have left here in my opening statement, if Professor Apt had been allowed to testify, he would have told us that an RES is impractical, requires a lot of transmission construction and is not the most cost-effective way to reduce CO<sub>2</sub>. He would have also explained that the grid can't handle more than 20 percent of its power coming from an intermittent source such as wind and that the highly interconnected electricity grid is subject to cascading blackouts when there are disturbances, even in remote areas. Professor Apt is the executive directive of the Carnegie Mellon Electricity Industry Center, and he has conducted important work on the inefficiencies of RES. At some point in time I hope that his report will be included and I haven't given up hope that he may at some point in time yet be allowed to testify.

Let me also say that if we are going to have a renewable energy standard, I would change the terminology and make it a clean energy standard. I would include nuclear, I would include clean coal and then I would put some sort of a cap on cost increases so that as we go into this new world, we don't end up with cascading electricity retail and industrial price increases on our consumers and our industrial manufacturers that force many of them, in the case of industry, to go out of business and move their plants overseas, and in the case of our retail constituency, force them into lifestyles that are less than they are today.

With that, Mr. Chairman, I yield back.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Pittsburgh, Mr. Doyle.

Mr. DOYLE. Thank you, Mr. Chairman. Mr. Chairman, as we work on this committee to build a comprehensive national policy to address the very real threat of climate change, I think it is critical that we remember that different States and different regions of our Nation will face unique challenges as we all do our part to lower the emission of greenhouse gases into the air. A solution in one part of our country may not be workable in another due to the different resources each of our States possesses.

There is no doubt that our Nation's renewable energy portfolio must be expanded to meet the ever-growing energy needs of our citizens. Like most of you on this dais, I fully support increased investment and deployment of renewable sources such as wind, solar, hydro and geothermal power. We need to advance the efficiency of these technologies. We need to create incentives for investment in these sources of power and we need to ensure that the energy we

generate can be transmitted to where the real need is. However, we also need to ensure that we don't shut off the lights or dramatically increase the cost of electricity in the parts of our Nation where these renewable resources aren't as abundant. Many of our States have moved forward with their own renewable standards based on the resources available to them. In fact, in my State of Pennsylvania, we already have an 18 percent renewable standard and I would like to submit a summary of this policy for the record.

Mr. MARKEY. Without objection, it will be included.

[The information was unavailable at the time of printing.]

Mr. DOYLE. This standard sets up a two-tiered system that not only includes the aforementioned technologies like wind and solar but also includes distributed generation, large-scale hydropower, energy efficiency and even waste coal clean-ups. It recognizes the resources available in our State and has brought significant environmental benefits to our citizens. I think it is critical that any standard we pass in this committee take a similar approach and allow States the necessary flexibility to meet the compliance requirements. Simply stated, there is no silver bullet to solve the climate crisis and there is no silver bullet standard that can be achieved everywhere in our Nation.

Mr. Chairman, I look forward to working with you and the members of this committee to establish a workable and flexible renewable standard that will drive investment in new technology while recognizing the real-world cost and compliance issues we face.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Kentucky, Mr. Whitfield.

#### **OPENING STATEMENT OF HON. ED WHITFIELD**

Mr. WHITFIELD. Mr. Chairman, thank you very much and we certainly look forward to this hearing on a particularly important subject matter, renewable electricity standard.

I might say that over 90 percent of the electricity generated in Kentucky and about eight other States comes from coal and 50 percent of the electricity generated in the entire country comes from coal. Coal is a reliable, available and affordable resource. Shifting even a small amount of our electricity generation from coal to renewable sources of electricity such as solar and wind would cause problems dealing with availability, affordability and reliability. Kentucky, for example, cannot meet a larger percentage of its growing needs for electricity. That means either drastically reducing demand or importing large quantities of expensive renewable power from the West and Southwest over an interstate power grid that is simply not up to the task today. Importing large quantities of power will require significant, lengthy and costly upgrades to the cross-country transmission system when we have the ability to do that at home today.

So the question is, we all understand we need renewable power but how much will it cost, and I know that in one of the pieces of legislation that I have seen, there is an additional 5 cents per kilowatt-hour if States do not need their renewable mandatory sources. I had a local electricity company compute an electric bill on one industrial plant in my hometown with an additional 5 cents per additional kilowatt-hour, and it increased their rates by \$18,750 per

month. At a time when our economy is weak, we do not want to take an opportunity of forcing industries out of business, losing jobs and transporting those jobs to countries like China who are bringing on one new power plant with electricity every 2 weeks to produce electricity.

So as we move forward, I think we have to look at the total ramifications, the additional cost involved, and to make sure that we still have the opportunity to use our most abundant resource, and that is coal.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentlelady from California, Ms. Matsui.

Ms. MATSUI. Thank you, Mr. Chairman. I am very pleased to be here today and I also would like to thank all the witnesses for being here today too.

My State of California has a long history of support for renewable energy. While our initial renewable portfolio standard set a 20 percent goal by 2017, we have strengthened our commitment to 20 percent by 2010 and 33 percent by 2020. This commitment will lead to a cleaner plant and good-paying green job growth. The Sacramento region has been a laboratory on this issue and we have seen upwards of 100 clean energy companies emerging in our area from biofuels to solar to hydrogen fuel cells. These companies have brought good-paying jobs to a region in need. That is not to say that this has always been easy. While California has been a leader in this field, there are challenges to overcome. We will need to address a host of issues from transmission capacity to emerging technologies. I look forward to getting more insight on the challenges we must tackle and opportunities we will have from the witnesses we have here today.

Again, Mr. Chairman, thank you for highlighting this important issue and I yield back the balance of my time.

Mr. MARKEY. The gentlelady's time has expired. The chair recognizes the gentleman from Pennsylvania, Mr. Pitts.

#### **OPENING STATEMENT OF HON. JOSEPH R. PITTS**

Mr. PITTS. Thank you, Mr. Chairman. I would like to thank you for convening this hearing today on such an important issue.

Like all of us, I believe that renewable and alternative sources of energy are important parts of the process in curbing greenhouse gas emissions and increasing energy independence. However, as Congress considers legislation dealing with the RES, the renewable electricity standard, it is imperative that we include all forms of viable alternatives in this standard. I would like to highlight one of those today mentioned by the former chairman.

In my district, the Lancaster County Solid Waste Management Authority operates a waste-to-energy facility that is literally turning trash into clean energy. During a visit last year I had the opportunity to see this incredible technology firsthand right there on the banks of the Susquehanna River. Trash that would have otherwise filled the local landfill is instead producing 198 million kilowatts of electricity a year. The plant is operated using just 10 percent of the electricity with the other 90 percent being sold to the local electric provider. There are six waste-to-energy facilities in Pennsylvania, and the State depends on them to manage more

than 8,700 tons per day of municipal solid waste. A baseload generation capacity of 268 megawatts powers many homes and businesses in the State.

The old-line opposition to waste-to-energy facilities claims that they pollute the air. However, with significant advances in technology in the last couple of decades and the sorting and removal of much of the waste before it is burned, the emissions from waste-to-energy facilities have become increasingly clean. In fact, the Environmental Protection Agency says that electricity from waste-to-energy facilities is some of the cleanest energy out there.

The Europeans and Japanese have been utilizing this process at far greater levels for decades. China plans to build 300 plants like the one in Lancaster. They can see the great potential that is present in this technology. Therefore, I believe that as this committee considers RES legislation, it is imperative to include waste-to-energy as a key part of this. To not include waste-to-energy sends a signal that we are not serious about the value of all alternative and clean energy sources, and I might add that this applies to nuclear power as well. It does send the signal though that we truly do not care about energy independency and viable options for decreasing greenhouse gases. It makes no sense to haphazardly pick and choose what renewables and alternatives should be included and which should not.

So I hope this committee will recognize this value and efficiency of waste-to-energy as we move forward, and I yield back.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from California, Mr. McNerney.

Mr. MCNERNEY. Thank you, Mr. Chairman, for holding this important hearing.

My perspective comes from two experiences. First, I spent 20 years as an engineer in the wind industry business and saw the technology transform from a fringe industry to a highly successful, competitive business. Second, I have been running around meeting entrepreneurs and looking at some incredible technology that is available from around the country, so from these two experiences, I am certain that the technology is out there. We can meet whatever standards we put up, especially if it is on such a good purpose for reducing greenhouse gases, improving our national security, creating jobs. We can do this. The real limiting factor, in my humble opinion, will be what the federal and State legislatures do in this issue.

Renewable energy standards is one strong tool we have to move forward and has been highly successful in application. As my colleague, Ms. Matsui, said, in California we have had a very good experience. The utility companies have not only met the standards but they have met them ahead of schedule and are very enthusiastic about proceeding with this issue, and so when we get the utility companies to embrace the program, they turn on the local entrepreneurs, things start happening. So I think we need to move ahead and we need to be aggressive and we need to accept what we have to do and use this tool of renewable energy standards to make this happen.

With that, I yield back.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Louisiana, Mr. Scalise.

**OPENING STATEMENT OF HON. STEVE SCALISE**

Mr. SCALISE. I would like to thank the chairman for calling the hearing and look forward to hearing from the panel as we talk about renewable energy.

These are all important issues in the broader context of developing a comprehensive energy policy which our country sorely lacks. When we talk about a comprehensive policy, clearly we are talking about renewable sources of energy but we are also talking about the importance of conservation, efficiency, as we had the hearing earlier just a few days ago on that issue, but also you have to talk about the importance of the role that domestic production of oil and gas plays in that comprehensive energy policy strategy and ultimately our goal is not only to reduce emissions but also reduce our dependence on Middle Eastern oil, which not only is an economic threat but is a threat to our country's security.

So when we talk about the broader comprehensive policy and then specifically talking about renewable sources of energy, I think it is very important to talk about the role that wind plays, the role that solar plays in that, but I think it is also important to talk about the role that other renewable sources play as well, and one renewable source of energy that sometimes unfortunately gets left out of the discussion is the role that nuclear power plays and should play in this discussion, and I think right now it is not a part of that discussion and should be because it is a proven form of renewable energy, a form that many other countries have already figured out. Unfortunately, our country is behind in that and is going to continue to stay behind until we include nuclear power as a source of renewable energy, which it is, and unfortunately if it not going to be included in the legislation, we need to include it or otherwise we will have, I think, a failed renewable policy. So we are going to continue to show how the role nuclear plays in renewable energy is very important and very proven and is in fact adopted by many other countries.

With that, I will yield the balance of my time.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from New Jersey, Mr. Pallone.

**OPENING STATEMENT OF HON. FRANK PALLONE, JR.**

Mr. PALLONE. Thank you, Mr. Chairman. I want to thank all the panel for being here but I particularly want to point to my friend, Ralph Izzo, who is chairman and CEO of the Public Service Enterprise Group, which is a New Jersey-based energy company. Under Ralph's leadership, PSEG has been a leader in renewable investments. In February, PSEG's subsidiary announced their Solar for All program that will invest \$800 million to bring solar energy to communities by placing solar panels at Brownfield sites, government buildings, low-income housing areas and on utility poles, and PSEG has also announced the development of an offshore wind project off the coast of Atlantic City.

I mention these because they are great examples of how a renewable electricity standard can spur private investment into renew-

able energy. New Jersey has one of the most aggressive renewable electricity standards in the country requiring that 20 percent of our electricity needs come from renewable energy by 2020. New Jersey is one of the 28 States that require a renewable electricity standard, and thanks to these laws, all of these 28 States are experiencing faster growth in renewable energy, and I can just imagine what we would accomplish with a national RES.

I have long been a supporter of a renewable electricity standard. Last year I worked to help pass an amendment to the Energy Independence National Security and Consumer Protection Act that would have created an RES of 15 percent by 2020 nationally, and I am also a cosponsor of the chairman's bill that requires that 25 percent of our energy come from renewable energy by 2025.

Congress should be doing more to encourage investment in renewable energies. This should include tax incentives, low-interest loans and a renewable energy standard. By establishing a strong RES, we will be challenging energy companies and utilities to innovate and invest in renewable energy, and this will help us not only reduce greenhouse gases in this country but it also will create green jobs. PSEG's Solar for All program will create 400 to 500 direct annual jobs in my State, and I am happy that my State is on the frontline of renewable energy production and I am hopeful that Congress will pass legislation to establish a strong renewable electricity standard nationally.

Thank you, Mr. Chairman.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Missouri, Mr. Blunt.

Mr. BLUNT. Thank you, Mr. Chairman. This is a topic that almost all of us agree on, on the goal of renewable energy and a lot of our discussion of course is how we get there.

In November of 2008, Missouri voters approved the Missouri Clean Energy Initiative at the ballot, which creates a renewable portfolio standard for investor-owned utilities to utilize 15 percent renewable energy sources in their total output by 2021 and so the States are moving forward sometimes with initiative efforts in the States. I have a statement for the record, and the only thing I would like to emphasize, Mr. Chairman, from that statement is just my belief that for renewable portfolio standards to make sense and work, we need to be sure that we are categorizing and counting the things that are renewable, that do matter. That has to include, in my view, hydro, it has to include clean coal, it has to include nuclear and certainly the other things like the good example that Mr. Pitts just gave of waste-to-energy from Pennsylvania.

Thank you for holding the hearing, Mr. Chairman.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the chairman of the full committee, the gentleman from California, Mr. Waxman.

#### **OPENING STATEMENT OF HON. HENRY A. WAXMAN**

Mr. WAXMAN. Thank you very much, Mr. Chairman, especially for calling this important hearing today.

Renewable energy is going to be one of the key pillars of a clean energy economy. We are not going to be able to avoid catastrophic climate change without a dramatic increase in the amount of en-

ergy generated from renewable sources. Today only 2½ percent of our electricity comes from all non-hydro renewables, but fortunately the United States has tremendous renewable energy resources that we have only just begun to tap.

In addition to the so-called Wind Belt that extends from the Dakotas down to Texas, there is substantial biomass potential in the Southeast as well as significant solar resources in the Southwest and throughout the United States. The Department of Energy recently issued a report showing that we could get 20 percent of our needed electricity from wind alone by 2030. Every region of the country has renewable resources that could be tapped to achieve our national goal of expanding renewable energy generation and reducing global warming pollution. More renewable energy also means more good jobs right here in the United States. Over the last few years the wind industry has been an engine of job growth. Last year wind companies created 35,000 new jobs. Some climate solutions require big technological breakthroughs but renewable energy is something we can deploy today. We can ramp up wind, solar, biomass and geothermal electricity production now. As the deployment of clean energy increases, the cost for this technology will continue to decline.

A big driver for renewable energy development has been the willingness of States to forge ahead despite the absence of federal leadership. Twenty-eight States and the District of Columbia now have mandatory renewable electricity standards which require utilities to generate an increasing percentage of their electricity from renewable sources. These policies are working. More renewable energy is being generated with little or no effect on the electricity prices of American consumers.

One potential effect of a cap-and-trade system is a so-called dash to gas. Because burning natural gas for electricity produces less global warming pollution than burning coal, utilities may switch from coal to natural gas to reduce their emissions, and that could drive up the price of natural gas, increasing costs to consumers and companies that use it. When paired with a cap-and-trade system, a renewable electricity standard could help stabilize natural gas prices and prevent the dash to gas. By providing long-term incentives for renewables, a federal renewable electricity standard would also give a big boost to those clean technologies while reducing the chances that utilities would have stranded investments in dirtier technologies. I don't believe that a federal renewable electricity standard and a federal cap-and-trade system are duplicative or mutually exclusive. On the contrary, they may complement each other in important ways.

I look forward to working these synergies with our witnesses today and with members of the committee. I yield back my time.

[The prepared statement of Mr. Waxman follows.]

HENRY A. WAXMAN, CALIFORNIA  
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**Statement of Rep. Henry A. Waxman**  
**Chairman, Committee on Energy and Commerce**  
**"Renewable Energy: Complementary Policies for Climate Legislation"**  
**Subcommittee on Energy and Environment**  
**February 26, 2009**

Thank you, Mr. Chairman, for calling today's important hearing.

Renewable energy is going to be one of the key pillars of a clean energy economy. We will not be able to avoid catastrophic climate change without a dramatic increase in the amount of energy generated from renewable sources.

Today, only two and a half percent of our electricity comes from all non-hydro renewables. But fortunately, the U.S. has tremendous renewable energy resources that we have only just begun to tap.

In addition to the so-called "wind belt" that extends from the Dakotas down to Texas, there is substantial biomass potential in the Southeast as well as significant solar resources in the Southwest and throughout the United States.

The Department of Energy recently issued a report showing that we could get 20% of our needed electricity from wind alone by 2030.

Every region of the country has renewable resources that could be tapped to achieve our national goal of expanding renewable energy generation and reducing global warming pollution.

More renewable energy also means more good jobs right here in the U.S. Over the last few years, the wind industry has been an engine of job growth. Last year, wind companies created 35,000 new jobs.

Some climate solutions require big technological breakthroughs. But renewable energy is something that we can deploy today. We can ramp up wind, solar, biomass, and geothermal electricity production now.

JOE BARTON, TEXAS  
**RANKING MEMBER**

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 STEVE SCALISE, LOUISIANA

As the deployment of clean energy increases, the cost for this technology will continue to decline.

A big driver for renewable energy development has been the willingness of states to forge ahead despite the absence of federal leadership under the Bush Administration. Twenty-eight states and the District of Columbia now have mandatory Renewable Electricity Standards, which require utilities to generate an increasing percentage of their electricity from renewable sources.

These policies are working. More renewable energy is being generated with little or no effect on the electricity prices of American consumers.

As the Committee develops climate legislation, we should explore the option of a federal Renewable Electricity Standard as a complementary policy.

One potential effect of a cap-and-trade system is the so-called “dash to gas.” Because burning natural gas for electricity produces less global warming pollution than burning coal, utilities may switch from coal to natural gas to reduce their emissions.

That could drive up natural gas prices – increasing costs for consumers and companies that use natural gas as a feedstock for their products. When paired with a cap-and-trade system, a Renewable Electricity Standard could help stabilize natural gas prices and prevent a dash to gas.

By providing long-term incentives for renewables, a federal Renewable Electricity Standard would also give a big boost to those clean technologies while reducing the chances that utilities would have stranded investments in dirtier technologies.

I don’t believe that a federal Renewable Electricity Standard and a federal cap-and-trade system are duplicative or mutually exclusive. On the contrary, they may complement each other in important ways.

I look forward to exploring those synergies with our witnesses today.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Pennsylvania, Mr. Shimkus.

Mr. SHIMKUS. Pennsylvania has a lot of coal there too, Mr. Chairman.

Mr. MARKEY. The gentleman from Illinois.

Mr. SHIMKUS. I am honored to be considered from Pennsylvania, a fossil fuel state, which we are trying to protect their jobs too.

I have shown these posters before. A lot of the senior members of this committee were here during the Clean Air Act, and this is Peabody Mine #10, Kincaid, Illinois. When the Clean Air Act was passed, 1,000 mine jobs left. That mine is still closed. And we are moving hell bent to a cap-and-trade regime that for the fossil fuel industry will do the same thing, and whether that is coal and whether that is crude oil, whether that is oil shale, the day of reckoning is coming, and I just want to pose this as far as the last hearing on efficiency and the current hearing now on renewables, let us consider this: If we were to improve the efficiency of the existing coal power generation fleet by only one percentage point, that is to increase from 33 to 34 percent efficiency, which is doable with technology today, we would save more energy than we would gain by expanding existing wind generation capacity 12 fold. This increase in efficiency would also result in 3 percent reduction of carbon dioxide release from coal power generation for the same amount of power delivered. Going further, if we aggressively improve efficiency by four or five percentage points, then emissions could fall by 250 metric tons, about 13 percent of last year's carbon dioxide emissions from coal power.

So Mr. Chairman, I think as we have talked before here in the committee and also on the Floor that I hope you will save fossil fuel use, low-cost power and coal in any movement on climate change, and I yield back my time.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Georgia, Mr. Barrow.

#### **OPENING STATEMENT OF HON. JOHN BARROW**

Mr. BARROW. I thank the chair, and I want to welcome Mr. Stan Wise today also, one of the members of the Georgia Public Service Commission, because he has an insight to share in this.

I just want to add to all the concerns that have been raised about such proposals that don't include making room for nuclear as a part of the portfolio and not including efficiency and not crediting those things. The unintended consequences that we will get from this, a lot of folks are making proposals and telling us in Georgia that we have enough biomass to cover our end of the deal but I don't think folks realize that folks are writing checks in Georgia that Georgia biomass cannot cash. I would hope we would have learned from the unintended results of our first tentative efforts to stimulate the growth in alternative fuels, that a small mandate that can only be met with existing technology without really forcing folks to really create new technologies had the unintended consequence of driving up the cost of other things as you take things that are spoken for in other marketplaces and try and direct them toward your new area of interest. We learned that with the price of food, through corn and corn starch ethanol. I don't want us to

learn that lesson again at the price of Georgia consumers for Georgia biomass. We simply don't have the biomass in Georgia to meet the projections some folks are calling for without deranging the market for pulp for paper, lumber for construction. You name it, we could pick the State clean and not be able to generate enough to meet the mandates that are being proposed by some.

What I also want to raise is the idea that if we don't have a mandate that is going to be met, we are going to have essentially an income transfer from one part of the country to the other, and the unintended consequence of this will be that some ratepayers in other parts of the country will benefit from an income transfer without generating any new net renewables in that part of the country to show for it. I am willing to vote for some pain but not if there is no gain. If we can't get the gain in our part of the country because the only thing we can do is buy our compliance and we don't get any gain in net renewables anyplace else because they have a surfeit because the mandate is set so low they already got renewables to burn, we are not going to get any new renewables anyplace else to show for the sacrifice being asked of some parts of the country. I can't support that, and I want to challenge those who are going to propose these mandates that we make sure we get some net renewables someplace else to show for this. Otherwise we will have the irony of not supporting nuclear as an alternative in Georgia but providing money for other folks to support nuclear in other parts of the country as they get money to spend any way they want and they expand nuclear, even though is not supported by the proposed. So let us don't have that. Let us try and make sure that we got some new net renewables and we are all fed out of the same spoon.

Thank you, Mr. Chairman.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentleman from Texas, Mr. Gonzalez.

Mr. GONZALEZ. Waive opening, Mr. Chairman.

Mr. MARKEY. The chair recognizes the gentlelady from Wisconsin, Ms. Baldwin.

#### **OPENING STATEMENT OF HON. TAMMY BALDWIN**

Ms. BALDWIN. Thank you, Mr. Chairman.

As President Obama so clearly said on Tuesday night, to truly transform our economy, to protect our security and to save our planet from the ravages of climate change, we must ultimately make clean renewable energy the profitable kind of energy, and this not only means making investments in the development of new renewable energy technologies, but also taking policy steps to drive the production of more renewable energy in America. A federal renewable energy standard is one of the measures we need in place if we are to harness the power of clean renewable energy and be a leader in the 21st century global economy.

I am proud that my home State of Wisconsin has required electric providers to increase their use of renewables to generate electricity. Wisconsin's current RES requires utilities to produce 10 percent of their electricity from renewable energy sources by 2015, and last year the Governor's Task Force on Global Warming, comprised of members of a cross-section of Wisconsin's economy, rec-

ommended in its final report that the RES be increased to meet the 10 percent requirement 2 years earlier and reach 25 percent by 2025.

I do have some concerns and questions relating to the crafting of a federal RES that I hope we will discuss during this hearing today. Among them, what renewable energies should be allowed to qualify. For instance, Wisconsin has an abundance of woody biomass. Should that be included? What about energy derived from solar light pipe technology such as those made by a company in my home State? And what about some of the energy-efficient technologies that we discussed in our hearing just a couple of days ago including combined heat and power technologies and waste heat energy. I also have some questions about the constraints that we face in transmission as we generate more renewable energy.

But despite some of the challenges in defining and implementing a national RES, I believe it to be a key component, a key complementary measure to ending our dependence on foreign oil, tackling environmental degradation and addressing our economic recovery.

I look forward to our witness panel today, and I yield back the balance of my time.

Mr. MARKEY. The gentlelady's time has expired. The chair recognizes the gentleman from Louisiana, Mr. Melancon.

#### **OPENING STATEMENT OF HON. CHARLIE MELANCON**

Mr. MELANCON. Thank you, Mr. Chairman. I appreciate the attention that you have shown to this issue and I would like to thank the witnesses for taking time to be here this morning.

As I have said before in hearings, meetings and anywhere else people will listen, I believe that we must take climate change seriously because I have a grandson that I want to be able to enjoy the same planet that I did, whether it is hunting or fishing or any other reason. I want Louisiana's coast to still exist for his and the other generations to come.

That being said, I encourage all my fellow committee members to be reasonable and responsible in how we approach climate change policies. There can be large costs associated with some strategies and it is important more now than ever to ensure that those costs do not simply get passed down to the consumers, who are our constituents.

We are here today to discuss complementary policies to climate change legislation and the crux of such legislation would be to reduce emissions of carbon dioxide and other greenhouse gases, an important and time-sensitive task. Reducing emissions of carbon dioxide and other greenhouse gases is the right move to make but we should focus on that goal and not lose perspective. Wayne Leonard, who is the chief executive officer of Entergy, wrote an op-ed, which I would like to submit for the record, for the New York Times. In it he explains the realities of how a policy like RES would impact his company. He points out that having to invest in either development of renewable technology or the purchase of credits would drastically change their business model. It would create a drive towards cheaper and cheaper fuel sources to compensate for new costs, meaning that more expensive natural gas

would be squeezed out of production to make room for more cheaper coal. This dynamic would have the precise opposite effect that we should be aiming for by countering some of the emission reductions achieved by development of renewable electricity.

I would like to conclude by reiterating my support for efforts to reduce harmful greenhouse gas emissions but also to emphasize the importance of taking a balanced approach that keeps in mind the impact this will have on our increasingly burdened constituents.

Thank you, Mr. Chairman. I appreciate the time.

Mr. MARKEY. The gentleman's time has expired, and all time for opening statements has been completed for the members. I will now turn to our very distinguished panel. Our first witness this morning is Dr. Howard Gruenspecht. He is the acting administrator for the Energy Information Agency. Dr. Gruenspecht worked with the Department of Energy's Office of Policy as director of economics, electricity and natural gas analysis. Thank you for joining us, Mr. Gruenspecht. Whenever you are ready, please begin.

**STATEMENTS OF HOWARD K. GRUENSPECHT, ACTING ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION, DEPARTMENT OF ENERGY; RONALD BINZ, CHAIRMAN, COLORADO PUBLIC UTILITIES COMMISSION; STAN WISE, COMMISSIONER, GEORGIA PUBLIC UTILITIES COMMISSION; RALPH IZZO, PRESIDENT, CHAIRMAN AND CEO, PUBLIC SERVICE ENTERPRISE GROUP; AND EDWARD LOWE, GENERAL MANAGER, RENEWABLES MARKET DIVISION, GENERAL ELECTRIC**

**STATEMENT OF HOWARD K. GRUENSPECHT**

Mr. GRUENSPECHT. Thank you, Mr. Chairman and members of the committee. I appreciate the opportunity to appear before you today. The Energy Information Administration is the independent statistical and analytical agency within the Department of Energy that produces data projections and analyses to assist policymakers, help markets function efficiently and inform the public. We do not promote, formulate or take positions on policy issues, and our views should not be construed as representing those of the Department of Energy or the Administration. My testimony reviews the role of renewable electricity generation and recent EIA projections, provides an overview of the renewable resource base and discusses some key findings from some of our earlier analyses of renewable electricity standards.

As discussed in many of the opening statements, spurred by State renewable incentives and mandates as well as federal tax incentives for renewables and projected prices for natural gas and other fuels, our Annual Energy Outlook 2009 reference case projects that renewable energy sources will play a growing role in electricity generation as shown in figures 1 and 2 of my written testimony. Overall, the projected growth in non-hydropower renewable generation in our reference case constitutes 52 percent of the overall projected growth in electricity sales through 2020 and 38 percent of the growth in electricity sales through 2030. These estimates do not include the very recent American Reinvestment and

Recovery Act, which provides some additional incentives for renewable energy.

Let me now turn to some insights from recent EIA analyses of past proposals for a federal renewable electricity standard. First, because the levelized cost of renewable generation resources tends to be higher than that of equivalent conventional resources, there is a tendency for an RES to increase electricity prices and consumer expenditures on electricity though by relatively small amounts. For example, in our June 2007 study of a 15 percent RES, EIA found that residential consumers spent about four-tenths of a percent more on electricity than in the reference case. However, these electricity price impacts can be partially offset if fuel consumption for electricity generation such as natural gas and coal is reduced enough to reduce the price of these fuels. It is important to note that impacts on individual consumers and electricity sellers can vary considerably in part for some of the reasons that were brought up in the opening statements.

The impact on carbon dioxide emissions, which are not currently regulated at the federal level, depends on the fuels being placed. Carbon dioxide benefits are significantly larger when coal is displaced than when natural gas is displaced. Certain renewables such as biomass cofiring at existing plants directly displace coal use. Other increases in renewable generation generally displace the most costly generation source that would otherwise be used to meet demand. Due to the effect of increasing concerns related to greenhouse gas emissions on investor behavior, our new projections include fewer additions of new coal-fired power plants than earlier projections and that tends to reduce the displacement of coal from levels projected in our previous RES analyses.

Regarding regional impacts of an RES also raised in many of the opening statements, different parts of the country have access to different types of renewable energy with different cost and performance characteristics. Some parts of the country such as the Southeast would rely on a significant increase in the cofiring of biomass resources such as forestry residues in existing coal plants to move toward compliance with an RES. Other parts of the country such as the Great Plains or the Pacific Northwest are likely to focus on their abundant wind resources. The designs of all the federal RES proposals EIA has examined allow for renewable energy credit trading so electricity sellers in regions are not limited to locally available resources. However, in our June 2007 analysis of a 15 percent RES, EIA found that while some interregional trading credits occurred, most RES compliance occurred through growth in eligible generation within each region.

Looking at transmission issues, the need for expansion of the transmission system will depend on the stringency of an RES proposal and the desire to exploit some of the best renewable resources which are often located far from major population centers. The more stringent the RES proposal, the greater the likelihood that markets near the best renewable resources will not be able to absorb the potential increase in generation and additional transmission capacity would therefore be needed to move it to other markets.

Electricity demand and supply must balance continuously in the absence of cost-effective electricity storage technologies. As reliance on intermittent resources increase, the traditional electricity system paradigm of generation follows load becomes harder to sustain. Greater reliance on intermittent generation could be more easily accommodated with energy storage or if some portion of the load could be made to follow changes in generation, such as through smart grid technologies that allow for automatic or economically driven time shifting of non-critical loads.

In conclusion, as is the case with many energy issues, the devils or angels associated with the design of an RES or other types of energy policies are in the details. EIA is prepared to provide the committee with whatever assistance we can as you develop and design possible legislation.

Mr. Chairman and member of the committee, this concludes my testimony. I would be happy to answer any questions you may have.

[The prepared statement of Mr. Gruenspecht follows:]

**Testimony of**  
**Dr. Howard Gruenspecht**  
**Acting Administrator**  
**Energy Information Administration**  
**U.S. Department of Energy**

**before the**  
**Subcommittee on Energy and Environment**  
**Committee on Energy and Commerce**  
**U.S. House of Representatives**

**February 26, 2009**

Mr. Chairman, and members of the Committee, I appreciate the opportunity to appear before you today. My testimony reviews the role of renewable electricity generation in the Energy Information Administration's (EIA) *Annual Energy Outlook 2009 (AEO2009)* projections, provides a brief overview of the renewable resource base, and discusses key findings from earlier EIA analyses of proposals for a Federal renewable portfolio standard.

EIA is the independent statistical and analytical agency within the Department of Energy. We are charged with providing objective, timely, and relevant data, analyses, and projections for the use of the Congress, the Administration, and the public. Although we do not take positions on policy issues, we do produce data and analyses to help inform energy policy deliberations. Because we have an element of statutory independence with respect to this work, our views are strictly those of EIA and should not be construed as representing those of the Department of Energy or the Administration.

#### **Renewable Electricity Generation in the *AEO2009* Early Release Reference Case**

The projections in EIA's *AEO2009*, which extend through 2030, are intended to represent an energy future based on given technological and demographic trends, current laws and regulations, and consumer and supply behavior as derived from known data. EIA recognizes that projections of energy markets are highly uncertain and are subject to political disruptions, technological breakthroughs, and other unforeseeable events. In addition, long-term trends in technology development, demographics, economic growth, and energy resources may evolve along a different path than expected in the projections. The complete *AEO2009*, which EIA will

release in the coming weeks, includes a large number of alternative cases intended to examine these uncertainties.

Projections for electricity sales and generation in the *AEO2009* reference case reflect both market and policy drivers. Projected electricity sales are sensitive to changes in projected electricity prices, which reflect fuel prices, economic growth, and policies that promote energy efficiency, including recently enacted lighting and appliance standards. The projected generation mix reflects fuel prices, the impact of concerns regarding greenhouse gas (GHG) emissions on investment behavior, and the projected growth in sales. Several policy factors play an important role, notably the renewable portfolio standards (RPS) enacted in 27 states and the District of Columbia. *AEO2009* also reflects Federal policies that promote renewable generation sources, including the production tax credit (PTC) for wind through the end of 2009 and for other eligible resources through 2010, as well as investment tax credits for solar photovoltaics (PV) through 2016, reflecting provisions of the Energy Improvement and Extension Act of 2008. The *AEO2009* reference case does not, however, include the further 3-year extension of the PTC and other provisions to promote renewable energy and energy efficiency that were enacted earlier this month as part of the American Recovery and Reinvestment Act of 2009. EIA is currently analyzing the impact of these provisions, which are expected to raise the projected amount of renewables.

Spurred by State renewable incentive programs, tax incentives for renewables, and projected prices for natural gas and other fuels, the *AEO2009* reference case projects that renewable energy sources will play a growing role in electricity generation (**Figures 1 and 2**). In absolute terms, the largest growth in nonhydroelectric renewable generation is projected to come from biomass

and wind power. Between 2007 and 2030, generation from biomass power—both co-firing in existing coal plants and the addition of new plants—increases by more than 500 percent, while generation from wind power increases by more than 300 percent. While solar power is expected to remain a relatively small part of the overall renewable generation mix, it is projected to increase by more than 1600 percent between 2007 and 2030. The growth in solar power is spurred by the State renewable programs and the investment tax credit provisions in the Energy Improvement and Extension Act of 2008 that extended the credit through 2016 and removed the cap on the size of the credit.

Overall, the projected growth in nonhydropower renewable generation in the *AEO2009* reference case constitutes 52 percent of overall projected growth in electricity sales through 2020 and 38 percent of growth in electricity sales through 2030.

Another perspective on projected renewable generation in the *AEO2009* focuses on its share of electricity sales. Share calculations relevant to consideration of any particular RPS proposal must be constructed to reflect its design features. RPS credits available to renewable generators depend on which renewables count and whether there are double or triple credits for some specified renewables, such as distributed PV and wind, or for renewables in specified locations, such as Indian lands, which affect the numerator in the RPS share calculation. Some proposals that EIA has analyzed also allow credits for efficiency programs to count towards meeting the RPS target up to a specified percentage, at the option of State governments. Exclusions from the RPS, another key design feature, affect the denominator of the RPS share calculation. Several past RPS proposals have exempted utilities below a specified sales cutoff value, existing

hydropower and municipal solid waste (MSW) generation, and sales from cooperatives and/or municipal utilities from RPS coverage.

Some sample calculations based on the *AEO2009* illustrate how design features affect RPS share calculations. For example, if existing hydropower and MSW are not eligible for RPS credits, as in many RPS proposals that EIA has analyzed in the recent past, and no electricity sellers are exempted from the RPS, RPS eligible generation projected in the *AEO2009* reference case provides 7 percent of total electricity sales in 2020 and 9 percent of total electricity sales in 2030. The same calculation done in a manner that provides triple RPS credits for distributed wind and solar and provides an exemption from RPS coverage for the same categories of electricity sellers exempted from coverage by the RPS proposal in H.R. 890 shows RPS credits from the same *AEO2009* generation profile equal to 9.6 percent of covered sales in 2020 and 11.6 percent of covered sales in 2030. These sample calculations do not represent the full range of possibilities, since they do not consider the possibility of credits for efficiency or double credits for renewables in certain locations.

The *AEO2009* RPS share, calculated in accordance with the crediting and coverage rules in any specific RPS program design and adjusted for the projected impact of the American Recovery and Reinvestment Act on the energy sector, characterizes the projected starting point for compliance. Some combination of additional generation from RPS-eligible sources, credits for efficiency (if allowed under the RPS program), or RPS credits purchased from the government if a safety valve provision is included in the program and comes into play, would then be required to close the gap between this starting point and the RPS targets.

**Renewable Resources**

The National Energy Modeling System (NEMS), used to produce the *AEO2009*, represents the major renewable energy resources with significant mid-term potential to contribute to U.S. electricity markets. These include resources for onshore and offshore wind, biomass, solar, geothermal, landfill gas, and hydroelectricity. EIA represents the total quantity of technically recoverable resources and, where applicable, the increasing cost of exploiting resources that are less accessible or of lower quality.

The wind resources included in NEMS are derived from work done at the National Renewable Energy Laboratory (NREL) to characterize the location, extent, and accessibility of the U.S. wind resource base, as shown in **Figure 3**. Land-based wind resources vary significantly in development cost and economic performance, based on average wind speed, distance from transmission lines and from demand centers, and even the roughness of terrain and access to construction infrastructure and other factors. In addition, some resources may be in aesthetically or environmentally sensitive areas with high mitigation or opportunity costs for development. EIA estimates that wind resources in excess of 15.7 miles per hour annual average wind speed at 50 meters altitude could, in theory, accommodate 3,700 gigawatts of wind capacity, compared to a current installed capacity base of approximately 25 gigawatts. The estimated cost to develop these resources ranges from about \$2,000 per kilowatt to more than \$6,000 per kilowatt, with about 250 gigawatts estimated to be available at a cost of less than \$2,400 per kilowatt. However, much of this resource is concentrated in areas away from the bulk of the U.S. population. In some regions, the available resource is in excess of local demand or grid capacities to absorb the intermittent output of wind generators, while in others the available

resource can serve only a small fraction of load. NEMS allows for the construction of some interregional transmission, but this projected transmission construction adds additional cost to the wind development and may not entirely alleviate the problem.

Offshore wind resources are potentially more productive than onshore resources and are generally located closer to major population centers. While there is significant uncertainty over the cost of exploiting this resource, EIA estimates that it is significantly higher than the cost of onshore development, based on the limited data available from Europe. Like onshore resources, the cost of the offshore resources increases with increasing utilization of the resource, in part influenced by the same factors that increase the cost of onshore resources, such as distance to load centers, environmental or aesthetic concerns, variable terrain/seabed, and also by water depth.

Biomass can be converted to electricity in either dedicated plants or co-fired as a small fuel fraction in existing plants. Some types of biomass may also be suitable for producing liquid fuels such as ethanol. NEMS represents four distinct types of biomass material available to the electric power sector: forestry residues, urban wood waste and mill residues, agricultural residues, and energy crops. As with most renewable resources, availability varies significantly by region. Based largely on recent work from the University of Tennessee, costs are estimated to rise with increasing supply, as shown in **Figure 4**. This reflects the value of some feedstocks to alternative uses, increasing collection and separation costs, and the value of energy crop lands for other uses such as food and feed production. Energy crops are not yet commercially established in the United States, and EIA assumes that their development will take some time. As a result, the supply of agricultural residues and energy crops varies over time in the *AEO2009*

projections. In 2010, total biomass available to electric generators is estimated at 7.6 quadrillion Btu; by 2020, EIA estimates total biomass supply at 10.7 quadrillion Btu, at costs ranging from \$1.60 to more than \$6 per million Btu. By comparison, the United States used approximately 21 quadrillion Btu of coal for electricity generation in 2007 at an average cost of about \$1.80 per million Btu.

Solar resources are found across the entire United States. NEMS represents two types of solar technology: solar thermal power and photovoltaics. Solar thermal power requires direct sunlight and is assumed to be only economically viable in the more arid regions of the Western United States. Photovoltaics can be used throughout the United States. Available sunlight in the United States is several orders of magnitude in excess of plausible electricity demand; therefore, EIA does not represent absolute limits or increasing cost of supply for this resource. However, the resource is constrained by high investment costs, availability of host sites for the more viable distributed applications, and the ability of the grid to accommodate its highly cyclical and intermittent output.

Turning to geothermal energy, EIA considers resources that can be utilized by technology for electricity generation that is available or expected to be available in the near future. EIA uses a site-specific database of known hydrothermal resource areas with well-characterized costs and capacities; this database totals 8.9 gigawatts of total capacity. The United States currently has an installed geothermal capacity base of 2.4 gigawatts. Both the existing capacity and the exploitable resource are located in the Western United States. Future technology that may allow for the exploitation of other types of geothermal resources is not yet at a level of development where EIA can reliably estimate cost or performance and is not included in NEMS.

For hydroelectricity, EIA relies on a site-by-site database of potential new capacity. The database includes about 22 gigawatts of potential new capacity, although much of this is not economically viable because of high capital costs and environmental concerns.

Finally, EIA represents opportunities for new landfill gas capacity based on Environmental Protection Agency estimates of viable landfills in the United States. New opportunities are estimated at about 5 gigawatts, but as with other renewable resources, exploitation costs vary significantly and the entire resource base may not be economic.

EIA does not estimate resources for a variety of pre-commercial renewable technologies including tidal/in-stream hydropower; wave, ocean thermal, enhanced, or engineered geothermal energy; or other solar and wind technologies in early stages of research and development. In most cases this is the result of insufficient data on resource cost and availability and/or technology cost and performance characteristics. With future research and development and changing market and policy conditions, some of these resources may become commercially viable. As technologies approach this point of commercial introduction, improved data should be available to allow their incorporation into EIA projections.

#### **Insights from EIA Analyses of Past Proposals for a Federal Renewable Portfolio Standard**

Over the past several years, EIA has produced a number of analyses of Federal RPS proposals. EIA's two most recent RPS studies, issued in June and December 2007 (see [http://www.eia.doe.gov/oiaf/service\\_rpts.htm](http://www.eia.doe.gov/oiaf/service_rpts.htm)), considered two variants of a 15-percent RPS.

Because of changes in energy markets and policies since those analyses were prepared and the role played by the design features of the programs that were modeled, specific results of these analyses may not be directly applied to proposals currently under consideration. Nonetheless, as discussed below, several insights from these prior reports are applicable to many current or future proposals.

### **RPS Accounting Issues**

In general, a higher RPS target—generally measured as renewable generation as a percentage of covered sales—should result in more renewable generation. As illustrated in the sample calculations presented above, however, the actual amount of additional renewable generation that an RPS would be expected to spur is highly dependent on which renewables are eligible for RPS credits, the availability of bonus credits for certain renewables, whether efficiency programs can be counted as a substitute for renewables, and the exclusion of some electricity sales from coverage by the RPS program. All of these factors may cause the “effective” target share of an RPS program to differ from its stated target. For example, the RPS included in H.R. 3221—an energy bill which passed the House of Representatives in August 2007 but which was ultimately not included in the Energy Independence and Security Act of 2007—had a stated RPS target of 15 percent. However, after accounting for exclusion of significant amounts of electricity sales from coverage, the availability of credits for efficiency, and extra credits for renewable generation meeting specified type and/or location criteria, the effective target level for generation by eligible renewables as a share of national sales could be as low as 8 percent.

The actual impact of an RPS on renewable generation may also depend on the design of the market for renewable energy credits. Credits facilitate compliance by allowing covered sellers with poor access to low-cost renewable resources to transparently pay those with better access to over-comply. Most Federal RPS proposals analyzed by EIA limit the credit price, usually by allowing market participants to buy credits from the government at a given price. These government-supplied credits do not represent any actual renewable generation, so once the market price for credits rises to this pre-set credit price ceiling, incremental increases in renewable generation generally stop. Compliance is achieved, but renewable generation does not reach the RPS target.

Program sunset (expiration) dates tend to increase the credit price as the expiration date nears, as credit suppliers have less time available to recover their costs since the credits are worthless after the sunset. For this reason, sunset provisions can increase the likelihood that a credit price cap, if incorporated, will be triggered.

#### **Impact of an RPS on Energy Prices and Expenditures**

The impact of a given RPS proposal on energy prices and expenditures depends upon its details, market conditions, and what other policies, including production and investment tax credits and/or limitations on GHG emissions, are in place.

One approach that is often used to compare different generation technologies is to estimate their levelized costs, which represent the discounted per-kilowatthour costs of building and operating a plant at its typical operating rate, i.e., capacity factor. Because the levelized cost of renewable

generation resources tends to be higher than that of equivalent conventional resources (if it was lower, renewable generation would penetrate rapidly without an RPS), there is a tendency for an RPS to increase electricity prices. However, these electricity price impacts can be partially offset if fuel consumption for electricity generation, such as natural gas and coal, is reduced enough to reduce the price of these fuels. The impact of the RPS on natural gas or coal prices and the subsequent feedback to electricity prices largely depend on which of those fuels is favored in the market for new plants. If natural gas is the favored expansion resource, as seems to be the case in the current market, renewable generation may require lower credit prices to be competitive, since the higher operating cost of natural-gas-fired plants is more likely to set the price with which renewables compete.

On a national average basis, EIA's previous RPS analyses found that electricity prices and consumer expenditures on electricity tend to change by relatively small amounts. For example, in EIA's June 2007 study of a 15-percent RPS, EIA found that, with the RPS, residential consumers spent about 0.4 percent more on electricity than in the reference case. However, impacts on specific sellers may vary significantly. Some will be purchasing renewable energy credits and others selling credits, some will have decreases in natural gas or coal prices passed through to customers through cost-of-service regulation, while others will see those reductions reflected in the cost of power purchased in competitive markets.

An RPS can also affect consumer prices and expenditures for natural gas through its impact on natural gas demand for electric power generation. In the June 2007 study, natural gas expenditures were reduced by 0.1 percent, so that combined expenditures on electricity and natural gas increased by 0.2 percent.

**Impact of an RPS on Emissions of Criteria Pollutants and Carbon Dioxide**

For criteria emissions, such as sulfur dioxide, that are already constrained by a national or regional emissions cap, EIA's past analyses have found that an RPS generally does not result in significant emission reductions. However, the price of an emission allowance under an RPS is often reduced as generation from emitting sources is displaced.

The impact on carbon dioxide emissions, which are not currently constrained by a cap-and-trade system or otherwise regulated at the Federal level, largely depends on the fuels and generators being displaced -- carbon dioxide reductions are significantly larger when coal is displaced than when natural gas is displaced. Certain renewables, such as biomass co-firing at existing plants, directly displace coal use. Other increases in renewable generation will generally displace the marginal (most costly) generation source that would otherwise be used to meet customer load whenever the renewable generation source is available. Due to increasing concerns related to greenhouse gas emissions on investor behavior, the *AEO2009* projections include fewer additions of new coal-fired power plants than earlier *AEO* editions. For this reason, coal is less likely to be the marginal generation source, which tends to reduce the displacement of coal from levels projected in previous RPS analyses.

When compared to analyses EIA has done on policies specifically addressing carbon dioxide emissions, EIA finds that, even when a comparable level of renewable generation is achieved, carbon dioxide emission reductions are seldom similar. With relatively small impacts on electricity prices, an RPS has little impact on overall electricity consumption. Reduced natural

gas consumption in the electric power sector results in reduced natural gas prices, which may then result in natural gas consumption increases in other sectors, and may negate some of the carbon dioxide emission reductions in the electricity sector. Finally, RPS policies do not incentivize carbon dioxide emission reductions from other sources within the electric power sector, such as nuclear or carbon capture and sequestration, or from outside the power sector. While some of these other carbon dioxide reduction opportunities are likely to be more expensive than renewable generation, others may be lower in cost.

### **Regional Impacts of an RPS**

Different parts of the country have access to different types of renewable energy with different cost and performance characteristics. Some parts of the country, such as the Southeast, may initially rely on a significant increase in the co-firing of biomass resources, such as forestry residues, in existing coal plants to comply with the RPS. Other parts of the country, such as the Great Plains or Pacific Northwest, will tend to expand generation using their abundant wind resources. Exploitation of solar resources, when encouraged by specific policy provisions, may depend as much on the retail cost of power as on the quality of solar resource in a given location.

The designs of all of the Federal RPS proposals EIA has examined allow for renewable energy credit trading. Credit trading means that utilities and regions are not limited to locally-available resources in complying with the RPS. However, in its June 2007 analysis of a 15-percent RPS, EIA found that while some interregional trade in credits occurred, most RPS compliance occurred through growth in eligible generation within each region. For example, despite having a relatively poor wind resource, the Southeast was projected to be a net credit “exporter” through

2019 using its biomass resource and after that date met more than 80 percent of its RPS requirement within the region.

#### **The RPS, Electricity Transmission, and Intermittency of Certain Renewables**

The need for expansion of the transmission system will depend on the stringency of the RPS proposal and the desire to exploit some of the best renewable resources, which are often located far from existing transmission and major population centers. The more stringent the proposal, the greater the likelihood that markets near the best renewable resources will not be able to absorb the potential increase in renewable generation, requiring additional long-distance transmission capacity to move it to other markets.

Although certain renewables, notably wind and solar power, are inherently intermittent, electricity demand and supply must balance continuously in the absence of cost-effective storage technologies. As reliance on intermittent sources increases, the traditional electricity system paradigm of “generation follows load” becomes harder to sustain. In EIA’s analyses, a lower capacity value is assigned to intermittent renewables than to other generation sources. Therefore, additional (“back-up”) capacity may be required to meet reliability standards in areas where significant amounts of intermittent renewables are deployed. Greater reliance on intermittent generation could be more easily accommodated with energy storage or if some portion of load could be made to follow changes in generation, such as through smart-grid technologies that allow for automatic or economically-driven time shifting of non-critical loads. For the most part, these technologies are not specifically addressed in previous EIA analyses of

RPS policy, where the projected levels of intermittent generation can be accommodated without their use.

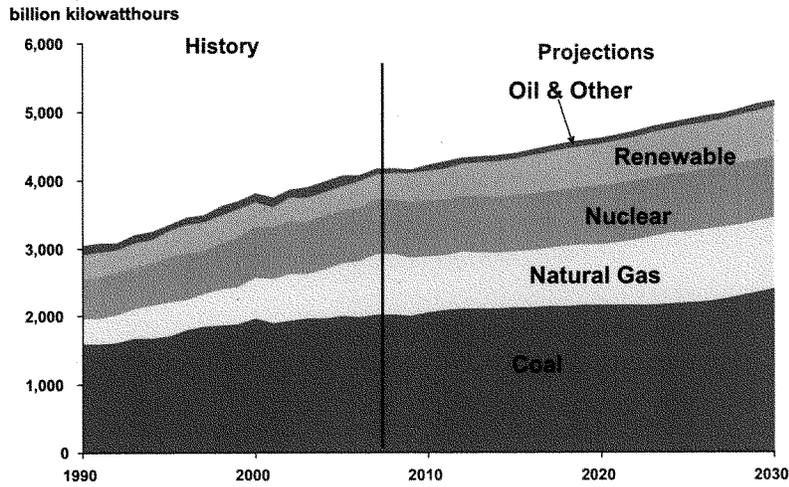
Of course, not all renewable generation is intermittent. For example, electricity generation from biomass, whether involving the co-firing of biomass at low percentages in existing units or the operation of plants designed to be fueled primarily or exclusively with biomass, can be dispatched. The *AEO2009* projections include significant growth in biomass.

**Conclusion**

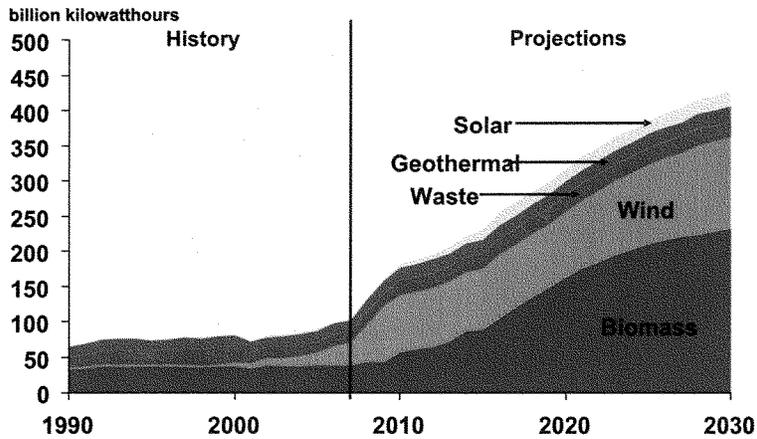
As in the case with many energy issues, the devils (or angels) associated with the design of an RPS are certainly in the details. I know that you, Mr. Chairman, have a long-standing interest in this area. While EIA does not propose, formulate, or advocate energy policies, we are fully prepared to provide the Committee whatever assistance we can, using our extensive data and analytical expertise in this area, as you develop and refine possible legislation.

Mr. Chairman and members of the Committee, this concludes my testimony. I would be happy to answer any questions you may have.

**Figure 1. Electricity Generation mix gradually shifts to lower carbon options**

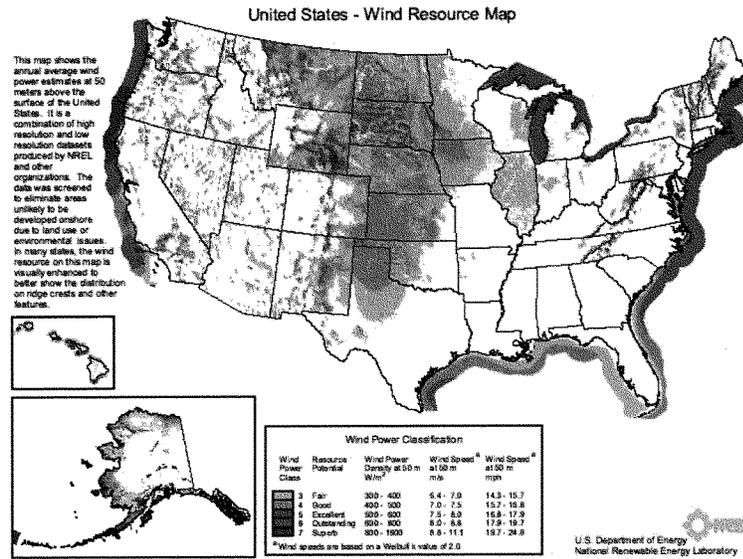


**Figure 2. Nonhydropower renewable power meets 38% of total generation growth between 2007 and 2030**

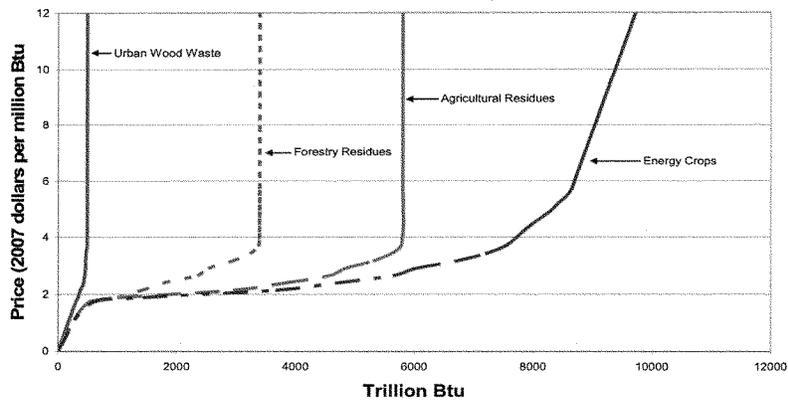


Source: Energy Information Administration, National Energy Modeling System run AEO2009.D112408B.

**Figure 3. Onshore and Offshore Wind Resources**



**Figure 4 – Cumulative Supply of Biomass Feedstock in 2020**



Source: Energy Information Administration, National Energy Modeling System

Mr. MARKEY. Thank you, Mr. Gruenspecht, very much.

Our second witness this morning is Mr. Ron Binz. He is the chairman of the Colorado Public Utilities Commission since 2007 where he has carried out Colorado's 20 percent state renewable electricity standard. Previously Mr. Binz was president of Public Policy Consulting specializing in energy and telecommunications policy. Welcome, Mr. Binz.

#### STATEMENT OF RONALD BINZ

Mr. BINZ. Good morning, Chairman Markey. It is nice to see you again after all these years.

My name is Ron Binz and I am the chairman of the Colorado Public Utilities Commission. It is my privilege and great honor to speak here today about the role that renewable energy will play in the Nation's attempt to address global climate change. I congratulate the chairman on calling this hearing and I look forward to the opportunity to talk about a real success story, what we call the New Energy Economy in Colorado.

Colorado is moving forward aggressively to adopt renewable energy as a major portion of our generation resources in the State. The collection of all those efforts of new jobs, of companies relocating to Colorado, of rural economic development, we call the New Energy Economy, and it is easy to date the beginning of that. It was Election Day in 2004 when the State's voters passed the renewable energy standard. It had failed three times in the legislature. Citizens took it to the ballot. It passed in 2004. After initial opposition to it, the utilities have come back to support the process. In fact, the legislature 2 years later doubled the standard in the State to 20 percent by 2020.

The New Energy Economy means more than just clean electrons. Colorado's Office of Economic Development traces 22,000 jobs, new jobs in Colorado, what we are calling green collar jobs. Now, to give you a sense of that scaled up to national numbers, that would be 1.25 million jobs nationally in this energy sector. Our investments in renewable energy are also helping the State make progress toward the Governor's Climate Action Plan. Significant wind and solar resources are reducing carbon emissions in the state. For that reason, Mr. Chairman, I would take slight exception to your notion of this being a complementary policy. We think of it as a foundational policy. Our belief is the reduction of CO<sub>2</sub> and greenhouse gas emissions is going to require the development of renewable energies is not just an add-on to a carbon policy, it is going to be a foundation of it.

I dwelt in my testimony about solar energy. I put a map in there that was developed by the National Renewable Energy Laboratory in Colorado showing solar resources around the country. Everyone knows that solar costs more than electricity produced by coal or natural gas today. Everyone also knows that the cost of PV is falling and many predict that it will achieve grid parity some time in the future but the cost of solar and other renewable technologies doesn't fall simply over time, it falls with the volume and deployment as that increases. Ramping up solar supply, just to again focus on solar, will thicken the supply chains and large manufac-

turing base, grow the commitment to R&D and generally increase competition in the design and installation of solar.

Much has been said about parts of the country who have relatively less wind power and I understand that Georgia, home of my soon to be former best friend, Stan Wise here, Georgia may not have the wind capacity that Colorado does but just to underscore, Mr. Pallone talked earlier about the efforts in New Jersey. New Jersey, maybe to your surprise, is the second largest State for solar deployment in the country, second only to California. The resources, the solar insulation levels in New Jersey are far poorer than they are in the southeastern part of the United States. I think the draft legislation wisely gives a three times credit for distributed solar generation. I think that is a very important step to boost the efficiency and economy of those kinds of resources.

I just want to conclude with two things. First, this salutary social effect of pushing renewable energy through an RES kind of standard is one of the main reasons that I as a regulator in Colorado hope that other States adopt RES policies. That will begin to bring these break-even points on cost closer in time to today. Bringing down the level of carbon emissions and the cost of renewable technologies is in my view a shared responsibility shared by all citizens of this country, and as far as I am concerned, that is where the nexus for federal interest in this matter derives.

As chairman of the Public Utilities Commission of Colorado, I can unreservedly endorse the benefits of a renewable energy standard. Because of the action of 28 States with RES policies, the costs are falling today. RES will provide a needed boost to that continued development. In my experience, it enjoys strong consumer support and can be implemented with reasonable impacts on rates. Thank you.

[The prepared statement of Mr. Binz follows:]

**BEFORE THE  
UNITED STATES HOUSE OF REPRESENTATIVES**

**COMMITTEE ON ENERGY AND COMMERCE**

**SUBCOMMITTEE ON ENERGY AND ENVIRONMENT**

**TESTIMONY OF RONALD J. BINZ**

**CHAIRMAN, COLORADO PUBLIC UTILITIES COMMISSION**

**“RENEWABLE ENERGY: COMPLEMENTARY POLICIES  
FOR CLIMATE LEGISLATION”**

COLORADO PUBLIC UTILITIES COMMISSION  
1580 BROADWAY, SUITE 250  
DENVER, COLORADO 80202  
FEBRUARY 26, 2009

**TESTIMONY OF RONALD J. BINZ**  
**CHAIRMAN, COLORADO PUBLIC UTILITIES COMMISSION**

Good morning, Chairman Markey and Members of the Subcommittee. My name is Ron Binz and I am the Chairman of the Colorado Public Utilities Commission. It is my privilege and great honor to appear before you today to discuss how renewable energy will be an essential and significant part of the nation's strategy to address global climate change. I congratulate the Chairman and the Subcommittee for examining this issue and appreciate the opportunity to talk about a real success story – the New Energy Economy in Colorado.

Here are the main points of my testimony:

- Colorado is moving forward aggressively to adopt renewable energy as a major portion of our generating resources in the state. It is easy to date the beginning of Colorado's significant move towards renewable energy: Election Day in 2004 when the state's voters approved a ballot measure that created Colorado's Renewable Energy Standard (RES).
- After initial opposition to the RES, Colorado's investor-owned utilities now support this approach. In fact, the utilities are running ahead of the compliance requirements of the RES. Xcel Energy is now the leading wind energy provider in the nation. The Company and has already acquired enough renewable energy to satisfy the Colorado RES for several years to come, even as they continue to acquire more renewable energy.
- Two years after voters passed the original RES, newly-elected Governor Bill Ritter championed legislation, passed by the general assembly, which doubled the RES requirement to 20% by 2020, and expanded its application to all Colorado's rural electric cooperatives. The legislation increasing the RES was supported by the state's utilities.
- During his campaign for office in 2006, Governor Ritter promised to build a "New Energy Economy" in Colorado. Through his leadership and the work other political and

business leaders, that vision is being realized. Colorado has attracted many new and relocating renewable energy firms, creating an estimated 22,000 direct “green collar jobs.”

- Colorado’s investments in renewable energy are also helping the state make progress towards the goals of the Governor’s Climate Change Action Plan. Significant amounts of wind and solar energy are reducing the carbon emissions of the state’s utilities, on the way to planned emission reductions of 20% by 2020. Our renewable strategy, along with energy efficiency and the development of advanced generation technologies, make up the foundational policies required for major reductions in greenhouse gas emissions.
- Colorado’s experience shows that a state can move quickly to exploit its natural renewable energy capacities. Colorado ramped up from about 60 MW of wind generation in 2003 to 1200 MW in 2008 and 2000 MW projected for 2014. Distributed solar deployment has followed a similar tack; in addition, we expect to have between 200 and 600 MW of solar thermal capacity on line by about 2017.
- In Colorado, renewable resources are mainly wind and solar power. In other parts of the country, biomass, geothermal, new hydropower and hydrokinetic power will be added to the mix. A state RES effectively creates demand for these generation technologies, accelerating the cost reductions for these technologies that only volume and experience will produce.
- Photovoltaic electricity can be widely deployed in the United States. The Southwestern U.S. obviously has superior solar resources. But photovoltaic opportunities are not limited to the Sunbelt. New Jersey -- second only to California in PV installations -- shows that photovoltaic electricity can successfully be developed even when solar insolation levels are less than ideal.
- As Chairman of the Colorado Public Utilities Commission, I can unreservedly endorse the benefits of a renewable energy standard. Because of the actions of 28 states with RES policies, the costs of renewable technologies are falling as experience with these energy sources grows. A RES provides the needed boost to that development. In our experience, a RES enjoys strong consumer support and can be implemented with reasonable impacts on electric rates.

### **The Development of Colorado's Renewable Energy Standard**

In November 2004, Colorado voters passed Amendment 37, a citizen-initiated change to the Colorado Revised Statutes, adopting Colorado's Renewable Energy Standard (RES). This was the first time in the country that a state's voters had passed an RES. The ballot measure succeeded after legislative attempts failed to produce a law in three successive years. The ballot measure was championed by the Republican Speaker of the House, and had broad support from environmental, citizen and rural and farm organizations.

The main features of Amendment 37 included:

- Applied to investor-owned utilities, rural electric cooperatives and municipal utilities that serve at least 40,000 customers.
- The measure required affected utilities to generate or acquire a specified minimum amount of renewable energy each year:
  - 3% of retail sales by January 31, 2006
  - 6% of retail sales by January 31, 2010
  - 10% of retail sales by January 31, 2015

In addition, at least 4% of the renewable energy must be produced from solar energy, half of which must be generated at the customer's location.

- Defined renewable energy to include energy generated using biomass, geothermal, solar, small hydroelectric, wind, and hydrogen derived from renewable energy sources.
- Permitted rural electric cooperatives and municipal utilities to exempt themselves from the RES requirements by a vote of their customers.
- Limited the rate impact of the RES to no more than 50¢ per month for residential customers.

Despite opposition from the state's electric utilities, voters approved Amendment 37 in 2004, and the Public Utilities Commission promulgated rules to implement the new law in 2005. Xcel Energy, the state's largest utility, began actively to solicit new wind and solar resources. One electric cooperative exercised its option to "opt-out" of the new law. In the 2006 gubernatorial campaign, Bill Ritter, Jr. outlined his vision of a "New Energy Economy" as part of his "Colorado Promise" campaign. He was elected Governor in November 2006 and began to work with legislative leaders to expand the RES law. In early 2007, the General Assembly passed HB 1281 that effectively doubled the RES requirements and brought more of the smaller utilities under the RES requirement.

Colorado's new RES law has the following features:

- 20% renewables by 2020 for investor-owned utilities
- 10% renewables by 2020 for rural electric associations and municipal utilities
- No opt-out provision
- For IOUs, 4% of renewables must be solar, at least half on-site
- There is a 1.25 REC multiplier for using in-state resources
- There is a 1.5 REC multiplier for community-based projects
- There is a 3.0 REC multiplier for REAs use of solar
- The maximum rate impact is 2% for IOUs, 1% for Munis and REAs

### **The Experience with Colorado's Renewable Energy Standard**

The passage of the state's Renewable Energy Standard served to jump-start Colorado's renewable energy industry. The tremendous growth in the state's renewable industry can be illustrated by highlighting these few examples:

- In the past two years, Colorado has quadrupled the amount of wind-generated electricity. Three new wind farms opened in 2007 alone, generating nearly 750 megawatts of electricity, enough energy to power 250,000 homes.
- The PUC estimates that the total amount of wind generation will grow to at least 1250 MW by 2010 and 1950 MW by 2015.
- Colorado grew from essentially no solar power in 2006 to a ranking of fourth in the nation in 2009 for installed solar capacity, almost entirely photovoltaic.
- At the end of 2008, Colorado's solar capacity stood at 24.5 MW. Xcel Energy has just issued a contract for a new 25 MW solar facility, and the PUC has approved Xcel's proposal to acquire at least 200 MW and as much as 600 MW of utility-scale solar generation with energy storage. At the same time, homeowners and businesses continue to install customer-sited photovoltaic panels.
- The PUC is aware that several unregulated utilities are making plans to acquire more renewable energy. Two large municipal utilities are planning to purchase additional wind resources or renewable energy credits (RECs). Other utilities are negotiating contracts for new wind projects in addition to those I've already listed.
- Tri-State Generation and Transmission Association has announced a project to augment its Escalante coal plant in New Mexico with steam produced from a solar thermal installation. Xcel Energy is looking to partially re-fuel a smaller existing coal plant near Grand Junction with steam from a concentrating solar facility to be built on the same site.

The desire by state and local governments in Colorado to assist homeowners with energy efficiency and renewable energy installations is evidenced by recent ordinances and pending state legislation:

- Boulder, Colorado recently passed an ordinance that will allow residents to finance new distributed generation by borrowing from the city and repaying the loan through property tax payments.
- Legislation is pending in the Colorado general assembly to allow the state treasurer to invest in bonds issued by banks, credit unions and other public and private lenders that make “clean energy loans” to individuals and businesses.

### **The Economic Impact of Colorado’s New Energy Economy**

Besides providing more clean energy to Colorado consumers, the RES and the Governor’s New Energy Economy have provided many related economic benefits to the state. The economic development can be illustrated by a few examples:

#### ■ **Wind**

- Denmark-based Vestas Blades opened its first North American manufacturing plant in Windsor in March 2008 and plans to open three additional production facilities in Colorado (two in Brighton and one in Pueblo). Vestas’ total commitment to Colorado represents a \$700 million capital investment and 2,500 new jobs.
- Renewable Energy Systems America Inc. relocated from Texas to Colorado in March 2008. The company designs, builds and operates wind farms.
- Texas-based Dragon Wind will open a plant in Lamar to build wind towers.
- Siemens Energy, the second largest global wind turbine developer, announced Colorado will house its North American Research and Development Center.
- Woodward Governor announced in March 2008 it will add up to 100 employees in Northern Colorado. The company manufactures wind turbine inverters.
- Connecticut-based Hexcel Corp, a producer of carbon fiber and other advanced composite materials and a Vestas supplier, is building a new facility in Windsor.

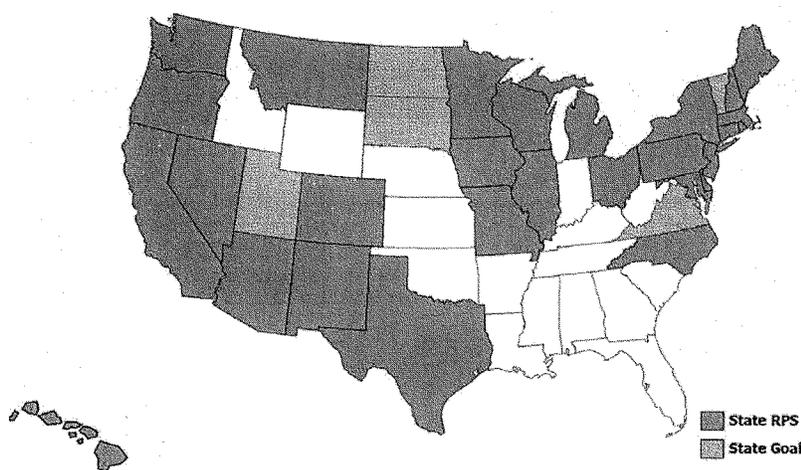
■ **Solar**

- Abengoa Solar has located its U.S. headquarters in Lakewood.
- Ascent Solar plans to build 1.5MW and 25MW production facilities in Lakewood.
- AVA Solar plans to build a solar manufacturing plant in Longmont.
- PrimeStar Solar of Golden received more than \$3 million in public-private funding to develop thin-film solar technologies.
- SunEdison's new photovoltaic facility generates power for 1,500 homes in the San Luis Valley and in 2008 was the nation's most productive photovoltaic solar plant. SunEdison opened an operations center in Westminster in 2008.
- Fort Carson opened the largest solar plant on a U.S. military base, and the Denver Federal Center, DIA, and the Belmar shopping district all opened large solar facilities.
- Arvada's SkyFuel Inc. unveiled its new SkyTrough, a high-performing, parabolic, concentrating solar array.
- Solar Technology Acceleration Center (SolarTAC) announced it will build the nation's largest public-private partnership for solar-energy development in Aurora.
- The Governor's Energy Office is offering rebates for residential and commercial solar electric, solar domestic hot water and other systems.

The Colorado Office of Economic Development and International Trade estimates conservatively that Colorado's New Energy Economy has produced 22,000 direct "green collar" jobs in the state. To put this number in perspective, a gain of 22,000 jobs in Colorado is equivalent to a gain of 1.28 *million* jobs at the national level, all from the clean energy sector.

### Design of State Renewable Energy Standards

As the Committee knows, 27 states plus the District of Columbia have adopted RES policies and five additional states have non-binding renewable goals, as reported by the Interstate Renewable Energy Council (IREC). The following map illustrates which states have adopted RES policies or goals:



Although these state plans have the same essential goal, there is variation in the state RES statutes as to goals, timing, credits, and definitions. For the past two years, a State/Federal RPS Collaborative, funded in part by the Department of Energy, has been examining many aspects of state RPS (RES) policies. The RPS Collaborative has developed a draft document detailing state RPS “best practices” and has begun to examine the interplay between existing state RPS plans and a potential federal RES.

Members of the National Association of Regulatory Utility Commissioners (NARUC) recently received an update of the activities of the State/Federal RPS Collaborative from Commissioner Phyllis Reha of the Minnesota Public Utilities Commission. Here are four slides from Commissioner Reha's presentation that set out the four major "best practices" for state RES design and operation identified by the State/Federal RPS Collaborative:

## Best Practices Recommendations 1

- RPS programs should be simple to administer, cost-effective to operate, and flexible enough to respond to changing market conditions.
- Establish predictable, stable requirements to reduce regulatory risk and improve financing opportunities
- Design should be non-discriminatory and enforceable and applicable to all suppliers of retail load
- RPS must be compatible with other public policies
- RPS Targets should be stable and ramp up steadily over time

## Best Practices Recommendations 2

- Targets should be achievable and encourage renewable resource development beyond existing available resources, given developable resource potential, transmission constraints, interconnection barriers, availability of complimentary mechanisms that support project development, and potential siting challenges.
- RPS should be of sufficient duration to allow for long-term contracting and financing.
- RPS rules should be stable

## Recommended Best Practices 3

- RPS should apply to all load serving entities including Investor Owned, Munis and Coops.
- In restructured markets, all suppliers to retail loads should be obligated to participate.
- There should be well-defined eligibility.
  - Fuel, technology and vintage definitions guided by social benefits of particular resources
  - Customer-sited generation eligible
  - Restrict eligibility of “old” resources
  - Ensure rules on out-of state resources are legally defensible and recognize value of regional market development

## Best Practices Recommendations 4

- RECs allow for flexibility, lower compliance costs, and simplify verification
- Clearly define REC and included attributes (e.g., does it include avoided carbon?)
- Enforcement
  - Consider use of alternative compliance payments
  - Set higher than estimated compliance cost
  - Dedicate to renewable development fund.
- Cost Recovery
  - Ensure cost recovery for prudent compliance costs
  - Encourage or require long-term contracting standards

Although these “best practices” describe state RES policies, most apply in turn to any proposed federal RES standard.

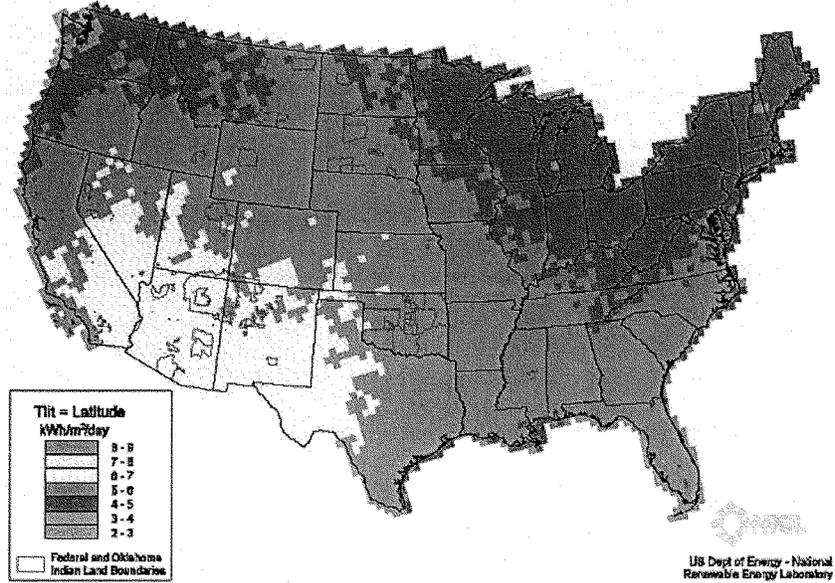
### **Interplay Between a Federal RES and State RES Policies**

Coming from a state with a very successful Renewable Energy Standard in place, I would respectfully urge that any proposed Federal RES not interfere with state programs with more stringent standards than the Federal plan. In other words, a Federal RES plan should be a floor, not a ceiling applied to state efforts.

Assuming that a federal RES does not preempt states' ability to maintain a state-level RES, care must also be taken to harmonize the accounting for Renewable Energy Credits (RECs) between the two regimes. In particular, renewable energy purchases under state RES should count towards the federal RES, but purchases of RECs to meet a state RES beyond federal target should not be traded or banked for use in federal RES compliance. Concerns such as these were carefully explained in a February 10 letter to Chairman Markey from the Clean Energy Group.

Renewable resources vary across the country, so care must also be taken in a Federal RES to incorporate flexibility that recognizes those differences. While Colorado has superior wind and solar resources, our state has modest biomass opportunities, a resource that is much more abundant in other parts of the country. The amount of direct solar "insolation" is high in Colorado and the Southwestern U.S. On the other hand, as the NREL map below demonstrates, solar potential from bright skies – useful for photovoltaic generation – is relatively high across much of the nation and is not limited to the Sunbelt.

**Figure 11. Solar Photovoltaic (PV) Resource Potential**



The map shows that, except for certain parts of the northern U.S., solar insolation levels are above 5 kWh per square meter per day, a very good PV resource. But even in the northern areas, solar values are above 4 kWh/m<sup>2</sup>/day, also good. Thus New Jersey – second only to California in installed PV capacity – shows that photovoltaic generation can successfully be developed even when insolation levels are less than ideal.

**Conclusion**

The existence of substantial U.S. photovoltaic potential, shown in the previous map, demonstrates why an RES is important. Everyone knows that solar electricity is today more costly than many other sources of electric supply. Everyone also knows that the cost of PV solar is falling and many predict that solar PV will achieve “grid parity” sometime in the future. But the cost of solar (and other renewable technologies) falls not simply with time, but, instead, as the volume of its deployment increases. Ramping up solar supply and demand will thicken the supply chains, enlarge the manufacturing base, grow the commitment to R&D, and increase competition in design and installation.

Enlarging the market and the deployment of solar PV will provide more clean energy. But more importantly at this stage, it will bring the “grid parity” date closer in time. Similar comments apply to other renewable technologies that today have only a small market share.

This salutary societal effect of a larger market for renewable energy technologies is one of the main reasons that I, as a regulator in Colorado, hope that other states adopt an RES and begin to include renewable energy in their states’ energy plans. Bringing down the level of carbon emission and the cost of renewable technologies is a shared responsibility.

I appreciate the opportunity to discuss Colorado’s experience with a Renewable Energy Standard. We are very proud of our achievements in Colorado in reducing carbon emissions through energy efficiency, renewable energy, demand response and resource planning. I hope this testimony is helpful to the Subcommittee as you continue your inquiry into complementary policies for climate legislation.

Mr. MARKEY. Thank you, Mr. Binz, very much.

Our next witness is Mr. Stan Wise, a commissioner on the Georgia Public Service Commission. He has previously served as Cobb County commissioner in Georgia and is a former president of the National Association of Regulatory Utility Commissioners. We welcome you, sir. Whenever you are ready, please begin.

#### STATEMENT OF STAN WISE

Mr. WISE. Thank you, Mr. Chairman. Thank you to the committee for this opportunity to speak before you today as you wrestle with this very difficult issue.

I am a publicly elected commissioner on the Public Service Commission and as a regulator I am responsible for ensuring that retail electricity customers receive safe, reasonably priced, reliable electric service. I am concerned that a one-size-fits-all RPS mandate fails to recognize that there are significant differences between the States and regions in terms of available and cost-effective renewable energy resources and that having such a standard in energy legislation will ultimately increase consumers' electricity bills.

We should be discussing ways to promote clean energy of all types. We need to develop and deploy all energy sources that can ensure an adequate supply of energy in the future, that can power our economy and that moves us forward to improving our environment, especially in ways that reduce greenhouse gases. Major energy sources that can meet these needs include nuclear, coal, coal with carbon capture and sequestration, natural gas, energy efficiency as well as wind, solar, biomass and geothermal. The distribution of these energy sources is different across the country. Some regions have more nuclear power than others, some coal, and others have wind and solar opportunities. We should be encouraging States and regions to take advantage of these sources that can best advance our energy and environmental goals with the understanding that the exact use of sources will be different in each State or region.

Establishing a uniform national RPS focused exclusively on a limited number of sources like wind, solar, biomass or geothermal without regard to crucial regional differences will unnecessarily drive up electricity costs, jeopardize reliability and divert capital that will be needed to achieve other objectives like meeting aggressive carbon targets. My State, for example, does not possess an abundance of what is described as renewable in many of the legislative proposals. The DOE data shows that Georgia does not have abundant solar energy that is available in other parts of the country, wind turbine generation available to States located in the Great Plains nor do we have abundant geothermal. My State and our region must seek to encourage the growth of research and development in the use of energy resources that are available and economically viable to provide our future needs. This will include the development of coal with carbon capture and sequestration, nuclear power, natural gas and energy efficiency. There is renewable development occurring in our State and currently we are considering a biomass plant that would replace a small coal-fired plant, and even though it is one of the largest in the country, it will only equal 100 megawatts. Some regions of the country have access to

wind resources. Wind can be a ready resource but has its limitations. Its availability is severely limited and cannot be dispatched by utility operators when the load demand peaks. A study by the Joint Coordinated System shows that several regional transmission planning organizations and the TVA in the Southeast does not and cannot meet anything greater than 30 percent all of the time. This gap demand would have to be recovered by building additional natural gas-fired generation. The report also shows that if the eastern United States were to meet the 20 percent of its energy requirements with wind, that 229,000 megawatts of wind capacity would have to be built. Some are discussing building transmission lines from areas with wind resources primarily in the West, to the eastern United States. These proposals raise concerns about cost, reliability and additionally transmission that doesn't solve the intermittent nature of wind resources.

Solar power has a capacity even lower than wind. Humidity and cloud cover in the Southeast makes it very difficult to maintain a capacity of lower than 20 to 25 percent. That would also have to be backed up with fossil fuels, most likely natural gas.

Mr. Chairman, I would like to go ahead and skip ahead to my summary to make sure that I have the opportunity to get this in. Even with the challenges it is still the desire of the Congress to impose these federal mandates, then certain conditions should be taken into account, that States should be allowed to develop renewable or clean energy standards that take into account the resources available in the State or region. This will ensure State-to-State equity while maximizing the benefits of expanding clean energy. Targets and timetables should be practical and allow State or regional variations depending on the resources available. The definition of qualifying resources that would count toward compliance with a federal standard should be expanded from the list in the current proposals including existing hydro that should count towards compliance the same as existing wind and solar. Nuclear generation should be included due to the fact that it emits no carbon. The definition of biomass should be expanded to include all recoverable wood material. This would include whole trees which are currently excluded from credit towards compliance. Energy efficiency should be included as a resource that would count towards compliance. This is a resource that is being expanded in Georgia and the Southeast and its use should not be limited in any federal standard. Utilizing municipal solid waste for energy production should be included toward compliance. This is a renewable resource that is available across the country and will reduce the use of other environmental impacts.

I thank the chairman for this opportunity.

[The prepared statement of Mr. Wise follows:]

**BEFORE THE  
UNITED STATES HOUSE OF REPRESENTATIVES  
COMMITTEE ON ENERGY AND COMMERCE  
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT**

**TESTIMONY OF STAN WISE  
COMMISSIONER, GEORGIA PUBLIC SERVICE  
COMMISSION  
“RENEWABLE ENERGY: COMPLEMENTARY POLICIES  
FOR CLIMATE LEGISLATION”**

GEORGIA PUBLIC SERVICE COMMISSION  
244 WASHINGTON STREET, SUITE 235  
ATLANTA, GEORGIA 30334  
FEBRUARY 26, 2009

1                   **Testimony of Georgia Public Service Commissioner Stan Wise before the**  
2                   **House Subcommittee on Energy and the Environment**  
3                   **Hearing on Renewable Energy**  
4                   **February 26, 2009**  
5

6                   Good Morning. I am honored to have the opportunity to appear before this  
7 distinguished Committee today to present testimony before you as you wrestle with this  
8 difficult issue.

9                   My name is Stan Wise. I am a publicly elected Commissioner of the Georgia  
10 Public Service Commission. As a regulator, I am responsible for ensuring that retail  
11 electricity customers receive safe, reasonably priced, reliable electric service. I am  
12 concerned that a “one size fits all” federal Renewable Portfolio Standard (RPS) mandate  
13 fails to recognize that there are significant differences among the states and regions in  
14 terms of available and cost-effective renewable energy resources, and that having such a  
15 standard in energy legislation will ultimately increase consumers’ electricity bills.

16                  We should be discussing ways to promote clean energy of all types. We need to  
17 develop and deploy all energy sources that can ensure an adequate supply of energy in  
18 the future, that can power our economy and that moves us toward improving our  
19 environment, especially in ways that reduce greenhouse gases. Major energy sources that  
20 can meet those needs include nuclear, coal with carbon capture and sequestration, natural  
21 gas, energy efficiency as well as wind, solar, biomass and geothermal. The distribution  
22 of these energy sources is different across the country. Some regions have more nuclear  
23 power, some have more coal and others have more wind or solar opportunities. We  
24 should be encouraging states and regions to take advantage of those sources that can best

1 advance our energy and environmental goals with the understanding that the exact use of  
2 sources will be different in each state or region.

3 On the other hand, establishing a uniform national RPS focused exclusively on a  
4 limited number of sources like wind, solar, biomass or geothermal, without regard to  
5 crucial regional differences, will unnecessarily drive up electricity costs, jeopardize  
6 reliability, and divert capital that will be needed to achieve other objectives like meeting  
7 aggressive carbon targets.

8 My state of Georgia for example does not possess an abundance of what is  
9 defined as renewable in many legislative proposals. According to Department of Energy  
10 data Georgia does not have abundant solar energy that is available to states in the Desert  
11 Southwest, the wind turbine generation available to states located in the Great Plains nor  
12 abundant geothermal. As a result, my state, and our region, must seek to encourage the  
13 growth of research and development in the use of energy resources that are available and  
14 economically viable to provide for our future needs. This will include the development of  
15 coal with carbon capture and sequestration, nuclear power, natural gas, energy efficiency  
16 and what renewable fuels that we might have. There is renewable development occurring  
17 in Georgia. For example, Georgia Power Company has worked to utilize landfill  
18 methane for power generation. They are also repowering a small coal fired power plant  
19 in South Georgia to use biomass for generation. Also, they are working with Georgia  
20 Tech to examine what wind resources might be available offshore. But we have to  
21 understand that all of these renewable resources together can't come close to meeting the  
22 extremely high levels of requirements in legislative proposals. During the earlier years  
23 covered in these legislative proposals we will have to continue our reliance on

1 conventional base load generation sources including new nuclear energy to ensure that  
2 reliable, reasonably priced, electricity is available to all of our citizens.

3         Some regions of the country have access to wind resources. Wind can be a ready  
4 resource but it has limitations. Its availability is severely limited and can not be  
5 dispatched by utility operators when load demand peaks. A recent study entitled the  
6 “Joint Coordinated System Plan” prepared by several regional transmission planning  
7 organizations and TVA shows that in the eastern U.S. when electric demand is at peak  
8 load wind is only available 30% of the time. The report goes on to conclude that the gap  
9 between that 30% and meeting 100% of the demand will have be filled by building  
10 natural gas fired generating capacity.

11         The report also shows that if the eastern U.S. were to meet 20% of its energy  
12 requirements with wind that 229,000 megawatts of wind capacity would have to be built.  
13 (A large windmill is about 2 megawatts so that would require the installation of 115,000  
14 windmills.) These 229,000 megawatts of wind would require over 67,200 megawatts of  
15 natural gas fired capacity to provide back up energy when the wind is not blowing.

16

17 Some are discussing building transmission lines from areas with wind resources  
18 (primarily in the west) to the eastern U.S. These proposals raise concerns about cost and  
19 reliability, additionally transmission doesn’t solve the intermittent nature of wind  
20 resources.

21         Solar power has a capacity factor even lower than wind. Humidity and cloud  
22 cover make solar power a very unlikely source for substantial production in Georgia and  
23 the southeast. Its cost is also extremely high even when considering federal production

1 tax credits. With a capacity factor as low as 20-25% in the southeast solar will also have  
2 to be backed up with fossil fuels most likely natural gas.

3

4 One renewable resource that we do have in Georgia and the southeast is biomass.  
5 We have for years supported a pulp and paper industry that has provided thousands of  
6 jobs and products that have grown our regional economy. We also have a timber industry  
7 that provides wood products for housing. But new demands are stressing the ability of  
8 biomass to meet the needs that we are putting on the resource. One example is the  
9 federal mandate for the production of ethanol. Of the current federal mandate some 22  
10 billion gallons a year are supposed to come from cellulosic sources which mean trees and  
11 other wood resources. Numerous ethanol plants are locating in the southeast and they  
12 will be in the market for biomass resources.

13 Some have said that utilities in the southeast can meet an RPS with biomass but I  
14 believe that people with that opinion dramatically underestimate the amount of fuel  
15 required to generate 20% of retail sales. For example if Georgia Power were to meet its  
16 20% requirement with biomass it would require some 2,300 megawatts of generating  
17 capacity. Recall that they are currently repowering a coal plant with biomass that will  
18 generate only 100 megawatts and this will be one of the largest biomass to electricity  
19 plants in the country! These 2,300 megawatts of capacity would need a sustainable forest  
20 of almost 4 million acres to be able to harvest enough biomass on an annual basis to meet  
21 the federal requirement. This would equal the land area of eleven counties in Georgia.  
22 Now layer on top of that demand the needs for cellulosic ethanol production and our pulp

1 and paper industry and I think most would agree that it is not possible to meet these large  
2 federal mandate with biomass.

3           So what are the options available for utilities to comply with a federal RPS? If  
4 renewable resources are not available at adequate levels in the state or region where the  
5 utility operates they can either purchase Renewable Energy Certificates (REC's) or pay  
6 an Alternative Compliance Payment (ACP) to the federal government. If buying REC's  
7 then ratepayers are buying a piece of paper that would come from a renewable resource  
8 somewhere outside the state. They are getting neither the renewable facility nor the  
9 electricity. If, on the other hand the ratepayers have to comply by making the ACP to the  
10 federal government then they essentially will be paying a tax. Again they get neither a  
11 renewable facility nor any energy.

12           In both of these situations, because of the limited amount of renewable resources,  
13 enormous amounts of money will flow from ratepayers in Georgia and the southeast to  
14 developers or utilities in other parts of the country or to Washington, D.C. Literally  
15 billions of dollars will flow from our ratepayers in this manner. This money from our  
16 ratepayer's pockets won't be available to invest in or develop truly clean energy in  
17 Georgia or the Southeast region that will be needed to meet future demands and  
18 effectively limit greenhouse gas emissions.

19           Even with these challenges if it is still the desire of the Congress to impose this  
20 federal mandate then certain considerations should be taken into account. They are:

- 21           • States should be allowed to develop renewable or clean energy standards  
22           that take into account the resources available in the state or region. This

1 will ensure state to state equity while maximizing the benefits of  
2 expanding clean energy.

3 • Targets and timetables should be practical and allow state or regional  
4 variations depending on the resources available.

5 • The definition of qualifying resources that would count toward  
6 compliance with a federal standard should be expanded from the list in  
7 current proposals. In this regard:

8 ○ Existing hydro should count towards compliance the same as  
9 existing wind and solar.

10 ○ Nuclear generation should be included due to the fact that it emits  
11 no carbon.

12 ○ The definition of biomass should be expanded to include all  
13 recoverable wood material. This would include whole trees which  
14 are currently excluded from credit towards compliance.

15 ○ Energy efficiency should be included as a resource that would  
16 count towards compliance. This is a resource that is being  
17 expanded in Georgia and the southeast and its use should not be  
18 limited in any federal standard.

19 ○ Utilizing municipal solid waste for energy production should be  
20 included towards compliance. This is a renewable resource that is  
21 available across the country and its use will reduce other  
22 environmental impacts from its disposal.

1           Finally if there are Alternative Compliance Payment provisions then payments  
2           under such a program should remain in the state where the utility ratepayer  
3           resides. This money should be available for energy investments and programs  
4           closest to and that will have the best chance of benefiting the ratepayer who will  
5           be paying the cost.

6   I understand and support the desire to expand renewable and clean energy. But we have  
7   to do it in a way that meets multiple goals. These goals are maintaining reliability,  
8   ensuring affordability and an adequate supply to meet the needs of our economy and our  
9   citizens and at the same time protecting our environment, including reducing greenhouse  
10   gas emissions. It is a balancing act. I am an elected representative like all of you on the  
11   panel and face these challenges every day. I know we can solve these challenges and I  
12   look forward to working with you in the future.

13

Mr. MARKEY. Thank you, Mr. Wise, very, very much.

Our next witness, Dr. Ralph Izzo, is the president, chairman and CEO of the Public Service Enterprise Group Incorporated. Mr. Pallone has already listed the distinguished history of Dr. Izzo. We welcome you, sir. Whenever you are ready, please begin.

#### STATEMENT OF RALPH IZZO

Mr. IZZO. Thank you, Mr. Chairman, Congressman Upton and members of the committee. Our family of companies distributes electricity and natural gas to more than 2 million utility customers in New Jersey and we own and operate approximately 17,000 megawatts of electric generation in the Northeast, Mid-Atlantic and Texas. I appear before you this morning to express my strong desire to see this Congress adopt a national renewable electricity standard. I would like to recognize your leadership, Chairman Markey, on this issue as well as that of Congressman Pallone, who has championed renewable energy for as long as I have known is, which is probably a lot longer than either of us care to think about right now.

Global warming is the most important environmental challenge of our time, and to avoid catastrophic impacts from climate change, most scientists agree that we must achieve carbon emission reductions of 80 percent by 2050. To reach this target, we urgently need decisive federal action, not a patchwork of state and regional fixes but a strong, progressive national energy policy. A carbon cap-and-trade program will be a central part of such a policy but we need a portfolio of solutions. To achieve necessary carbon reductions, we must do nothing less than electrify our transportation sector and decarbonize our electric sector. We need policies aimed directly at driving these transformations, and an RES will create demand for technologies that will transform the way we generate electricity. With this policy we will create jobs and we will develop new technologies that we can export all over the world. In other words, investment in renewable energy is a strategy for long-term sustainable growth.

As an investor and a businessman, I believe the adoption of a federal RES would create tremendous opportunities. PSEG, our company, our company, is already beginning to invest heavily in alternative energy. Two weeks ago, our utility filed a proposal with New Jersey regulators to invest almost \$800 million in solar generation over the next 5 years. This will include putting solar panels on Brownfields, low-income housing, government buildings and on roughly 200,000 utility poles. We are also planning a 350-megawatt offshore wind farm off the coast of southern New Jersey and we recently created a joint venture to develop compressed air storage facilities that can store energy and help make renewable generation more competitive.

A federal RES will send clear market signals to companies like ours to increase their investment in renewable electric generation. In the long term, these investments will be a net benefit to customers. In the short term, however, renewable energy is more expensive than fossil fuel generation. We must be upfront with consumers about these costs, but the most effective way to minimize cost is through a national approach. A strong national program will

create economies of scale and drive down production costs, and once developers can rely on a stable national market for renewable energy credits, it will reduce their cost of capital.

It is also worth noting that certain emerging renewable technologies such as offshore wind and solar will need additional federal incentives, particularly through the tax code. Fostering these industries is important to our long-term climate change strategy.

In closing, Mr. Chairman, as you know, our country faces daunting challenges. We must dramatically reduce carbon emissions and transform our energy economy and we must do this while we face rising unemployment and an economic crisis. Implementing an RES will send a clear signal to investors that a true shift has occurred in our approach to a national energy policy. Let us encourage sustainable investments to power our way out of this downturn. We need to get started now. Thank you.

[The prepared statement of Mr. Izzo follows:]

**TESTIMONY OF RALPH IZZO  
PRESIDENT, CHAIRMAN AND CEO  
PUBLIC SERVICE ENTERPRISE GROUP INCORPORATED**

**HOUSE COMMITTEE ON ENERGY AND COMMERCE  
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT**

**FEBRUARY 26, 2009**

Mr. Chairman, Congressman Upton and Members of the Subcommittee, my name is Ralph Izzo and I am President, Chairman and CEO of Public Service Enterprise Group. Our family of companies distributes electricity and natural gas to more than two million utility customers in New Jersey, and owns and operates approximately 17,000 megawatts of electric generating capacity concentrated in the Northeast, Mid-Atlantic and Texas.

I appear before you this morning to express my strong desire to see this Congress adopt a national Renewable Electricity Standard. I applaud Chairman Markey for his leadership on this issue, as well as New Jersey Congressman Frank Pallone, who has championed renewable energy for as long as I've known him.

I support a national RES as a citizen who is deeply concerned about climate change; as an investor who sees exciting opportunities in the renewable sector; and as the head of a company concerned about its customers and their ability to pay for green investments, particularly in this economic environment.

The reports of how our climate is already changing are increasingly alarming. Temperatures are rising, and the Arctic ice sheet and glaciers around the world are melting even faster than anticipated.

Global warming is the most important environmental challenge of our time. To avoid catastrophic impacts from climate change, most scientists agree that we must achieve carbon emission reductions of 80% by 2050. To reach this target, we urgently need decisive federal action – not a patchwork of state and regional fixes, but a strong, progressive national energy policy.

PSEG has advocated a three-pronged approach to reduce carbon emissions.

- Conservation through energy efficiency improvements.
- Development of renewable energy resources.
- And an expansion of clean, zero- and low-carbon central station electric generation, such as nuclear power.

Putting a price on carbon with a cap-and-trade program will help make progress toward all of these goals. However, effectively combating global warming will require a comprehensive package of policy solutions.

Meeting our carbon reduction targets will require that we electrify our transportation sector and decarbonize our electric generation. This cannot be achieved if we only focus on short-term, least-cost carbon reduction measures. We need policies aimed directly at

driving these transformations, and a federal RES will create demand for technologies that will transform the way we generate electricity.

With America's skilled workforce and entrepreneurial spirit, we should be leading this charge. But today we are playing catch up with other nations in developing renewable energy industries.

With the right national policy, America can develop the world's leading clean energy industry. We will create jobs. And we will develop new technologies that we can export all over the world. Investment in renewable energy is a strategy for long-term growth.

As an investor and businessman, I believe the adoption of a federal RES would create tremendous opportunities. PSEG is already beginning to invest heavily in alternative energy. Two weeks ago, our utility filed a proposal with New Jersey regulators to invest almost \$800 million in solar generation over the next five years. Under this program, we will install solar generation on brownfields, low-income housing and government buildings. It also will include roughly 200,000 solar installations on our utility poles. This is in addition to the more than \$100 million our utility is already investing in solar generation.

Our merchant renewable generating company is also developing solar, offshore wind and other alternative energy projects. Most notable among these is a joint venture with Deepwater Wind to build a 350 megawatt wind generation facility roughly 17 miles off

the coast of South Jersey. This project will use a patented technology that allows us to locate wind farms in deep water, virtually out of sight from the shore. We also recently created a joint venture called Energy Storage and Power to develop compressed air storage facilities that can store energy. This technology can be paired with intermittent renewable generation resources to make them more reliable and competitive.

Projects such as these are just the starting point of what America must build if we are going to combat climate change and grow a robust renewable energy industry. A national RES will send clear market signals to companies like PSEG to increase their investment in renewable electric generation.

Finally, as the head of a company with over two million customers, including the majority of New Jersey's low- and moderate-income families, I worry about customers' ability to pay for green investments.

In the long term, these investments will be a net benefit to customers. In addition to reduced carbon emissions, benefits include job creation, economic development, cleaner air and greater energy security. Moreover, modeling by the Energy Information Administration has shown that the renewable generation spurred by a national RES will likely displace older and less efficient fossil fuel plants, placing downward pressure on fossil fuel prices and the wholesale price of electricity. And over time, renewable technologies will become competitive with traditional sources of generation.

In the short term, however, these investments generally increase customer costs because today electricity from renewable generation is more expensive than electricity from fossil fuel generation. We must be candid with our customers about these higher costs as we emphasize the important benefits.

Any increase in the cost of electricity is of particular concern for low- and moderate-income families who already struggle to pay their bills. I strongly support the federal Low Income Home Energy Assistance Program (LIHEAP) and other state-funded programs to help such households. Improving energy efficiency is a more lasting solution for reducing customer bills. Our utility is already implementing programs in our urban centers to improve efficiency in homes, small businesses and hospitals.

The most effective way to minimize the price impacts of renewable energy requirements is through a national approach. A federal program will create economies of scale, and it will reduce the cost of capital once developers can rely on a stable, national market for renewable energy credits, or RECs. I believe that by establishing a robust national RES program, we will begin to move toward a single REC market as state policymakers eventually elect not to maintain separate regional renewable energy “currencies.”

For example, New Jersey has an RES that must be met with renewable energy generated within PJM, our regional electric grid. Energy from a wind farm in Illinois may count, but energy from a wind farm in Nebraska does not count, even though it may be a more affordable compliance option. Once a strong federal program is in place, state

policymakers may decide that making that distinction no longer makes sense for their ratepayers.

Of course, states will always be able to go above and beyond the federal standard and set a higher RES target. And states will likely want to maintain targeted efforts to promote specific renewable industries in their state, as New Jersey is doing with solar and offshore wind. But with a strong national program, we will begin to see more stability and uniformity in the market place.

As for the specifics of an RES policy, I believe the target of 25% renewable energy by 2025 – as President Obama, Chairman Markey and others support – is an aggressive but achievable goal. Some would contend that it is too aggressive, but given what scientists are telling us about climate change we have little choice but to make this work. Electric generation accounts for roughly 35% of our carbon emissions, and therefore a 25% RES would address just a fraction of that 35%. Given that we need to reach 80% by 2050, it is clear we need an aggressive RES.

I do not believe investments in energy efficiency should be allowed as a compliance mechanism under an RES. The RES should be used exclusively to promote renewable energy. Investments in conservation and efficiency are crucial, as they are currently the most affordable way to reduce carbon emissions. But Congress should promote energy efficiency through separate initiatives rather than allowing investment in efficiency to displace investment in renewables. We need to pursue both at full speed.

I also believe we need additional federal support for certain emerging renewable technologies, particularly through the tax code. A market driven approach like the RES will appropriately drive investment toward what are currently the most cost-competitive forms of renewable generation. However, developing promising industries, like solar and offshore wind, is an important part of our long-term climate change solution.

Finally, as I said earlier, the development of clean, central station power is a critical element to a coherent climate change policy. PSEG is a nuclear company, with over half of our generation output coming from our three nuclear units in South Jersey and a unit we partially own in Pennsylvania. Investment in new nuclear generation needs federal support. This should include fixing the loan guarantee program and supporting the manufacturing of key nuclear components. But I do not believe a federal RES is the appropriate mechanism to provide incentives for new nuclear generation.

In closing, Mr. Chairman, as you know, America faces daunting challenges. We must transform our energy economy in order to dramatically reduce carbon emissions. And we face rising unemployment and an economic crisis. We can begin to address all of these challenges by implementing a strong, national RES program and sending a clear signal to investors that a true shift has occurred in our approach to national energy policy. Let us encourage sustainable investments to power our way out of this economic downturn. We need to get started now.

Thank you and I'd be pleased to answer any questions.

Mr. MARKEY. Thank you, Mr. Izzo, very much.

Our final witness, Mr. Edward Lowe, is General Electric's energy general manager of renewable energy and market development. GE is one of the country's largest renewable technology producers and actually supplies half of all wind turbines in the United States. We welcome you, Mr. Lowe. Whenever you are ready, please begin.

#### STATEMENT OF EDWARD LOWE

Mr. LOWE. Thank you, Mr. Chairman and members of the committee. I appreciate the opportunity to testify on the potential impacts of a federal renewable electricity standard.

GE believes that a federal RES is the single most important step the Congress can take to lay the long-term foundation for a green collar workforce and a domestic renewable energy manufacturing base. Today GE's renewables business has an installed base of over 25 gigawatts in more than 65 countries, employs 4,700 people globally and we have created over 10,000 supplier jobs. Since entering the renewables business in 2002, GE has invested over \$850 million in renewable energy technology and production. We have increased wind turbine reliability and efficiency 12 and 19 percent points, respectively. We have developed leading-edge integration technology and we continue to invest in wind and solar technology advancements. During the time period we have tripled our U.S. wind assembly facilities and increased wind turbine production six fold. GE is the leading wind turbine supplier, as the chairman indicated, with nearly one of every two wind turbines in the United States being a GE wind turbine. This growth has created well-paying U.S. jobs. Nationwide, we employ 2,000 people in our wind and solar businesses in five States while supporting over 4,000 supplier jobs in 15 additional States.

An example of the economic benefits that we generate is a wind blade manufacturing facility that opened last year in Newton, Iowa, and was referenced earlier. This is owned by TPI Composites and employs 500 people in a facility that was previously closed by Maytag. In the past 2 years, wind turbine and turbine component manufacturers announced or added or expanded 70 facilities, 55 alone last year. This growth was driven by successive extensions of the wind production tax credit in 2005 and 2006 and the growth of State renewable portfolio standards. If Congress were to approve a federal RES this year, GE would expect to see considerable growth and demand for its renewable products. Responding to this growth would in turn prompt us to explore the expansion of our existing wind turbine facilities and construction of new facilities, increase commitments to component suppliers and add new suppliers. These investments could result in the creation of approximately 3,000 to 5,000 jobs to support our wind business. We are aware of 10 to 12 foreign suppliers who have expressed a strong interest in opening facilities in the United States but are awaiting a long-term policy signal to support the required investment.

Recent studies point to the job creation potential of a federal RES. The Department of Energy estimates that achieving 20 percent wind by 2030 would create 500,000 jobs. With accelerated policy support, the solar PV industry predicts 230,000 jobs by 2016. Based on our experience, State RPS programs should have certain

key elements, among which is an aggressive long-term goal out to 2020 or 2025, achievable interim goals, meaningful non-compliance teeth, tradable renewable energy credits and support for distributed generation. In addition, legislation to expedite transmission expansion is essential. Finally, a federal RES will be a critical down payment on future climate change legislation by accelerating the near-term deployment of wind, solar and other low- or zero-emission technologies.

In summary, a federal RES is essential to creating a sustained green collar workforce and a domestic renewable energy manufacturing base and a federal RES will also serve as a critical complement to climate legislation.

Thank you for holding this important hearing and the opportunity to present this testimony.

[The prepared statement of Mr. Lowe follows:]

**House Committee on Energy and Commerce  
Subcommittee on Energy and Environment**

**Hearing on  
Renewable Energy:  
Complementary Policies for Climate Legislation**

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February 26, 2009

Written Testimony of  
Edward C. Lowe  
General Manager, Market Development  
Renewables  
GE Energy Infrastructure

Mr. Chairman and members of the Committee, I am Edward Lowe, General Manager for Renewables Market Development at GE Energy Infrastructure. I appreciate the opportunity to testify on the potential impacts of a Federal Renewable Electricity Standard (RES), particularly regarding new job creation. GE believes that a Federal RES is the single most important step that Congress can take to lay the long-term foundation for a "green-collar" workforce and a domestic renewable energy manufacturing base. GE also believes that adoption of a Federal RES is absolutely essential for the United States to maintain a leadership position in the global renewable energy industry. Finally, GE believes that a Federal RES is an excellent example of the "complementary" policies that are needed to address climate change by accelerating the near-term deployment of commercially available technologies to reduce greenhouse gas emissions. I acknowledge Chairman Markey for his leadership on this important national issue.

GE Energy Infrastructure is a technology leader with more than 100 years of industry experience. Our global team of 65,000 employees operates in more than 140 countries. GE Energy's businesses offer a diverse portfolio of products and services including fossil power generation, gasification, nuclear, oil & gas, water, transmission, smart meters, and renewable energy technologies such as wind, solar, and biomass. GE is a relative newcomer to renewable energy, having entered the wind business in 2002 and the solar business in 2004. But Renewables have quickly become an important contributor to our

Energy Infrastructure business and one of the most exciting growth stories at GE.

### **Renewable energy in the US**

The record-setting growth of renewable energy has been one of the bright spots of the US economy. According to the American Wind Energy Association (AWEA), the US installed 8,358 MW of wind power in 2008, setting another record for annual growth. This growth increased installed wind capacity by 50 percent to 25,170 MW, enough to power 7 million households, and stimulated \$17 billion of investment in the economy.<sup>1</sup> The US is now the global leader in wind power, having surpassed Germany last year in both wind energy generation and wind installed capacity.

In 2008, wind accounted for 42 percent of all new US nameplate installed capacity, second only to natural gas at 46 percent. AWEA estimates that the wind industry employs over 85,000 people directly and indirectly, with 13,000 manufacturing jobs created in 2008 alone. When one includes the induced economic effect of new workers spending money on goods and services, the number of wind-supported jobs approaches 185,000.<sup>2</sup>

Solar power is also experiencing record growth in the US. According to the Solar Energy Industries Association (SEIA), the growth of solar photovoltaics (PV) doubled in 2008, with approximately 600 MW installed. SEIA estimates that the solar industry (which includes solar PV, concentrated solar thermal, and solar water heater technologies) directly or indirectly employs over 80,000 people in direct and indirect jobs, with 15,000 jobs added in the last two years.<sup>3</sup> The total number of solar-supported jobs is close to 150,000.<sup>4</sup>

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<sup>1</sup> American Wind Energy Association (AWEA), "Wind Energy Grows By Record 8,300 MW in 2008," press release, 27 January 2009.

<sup>2</sup> Estimate is based on Navigant Consulting analysis prepared for AWEA, November 2008, which uses US Department of Energy (US DOE) Jobs and Economic Development Impact (JEDI) model.

<sup>3</sup> AWEA/Solar Electric Industries Association (SEIA), "Solar and Wind Ready to Lead New Clean Energy Economy," press release, 9 January 2009.

<sup>4</sup> Estimate is based on Navigant Consulting, *Economic Impacts of Extending Federal Solar Credits*, 15 September 2008. Report uses US DOE Jobs and Economic Development Impact (JEDI) model.

**Renewable energy at GE**

GE's renewable energy business has grown dramatically to keep up with growing US and global demand. Since entering the industry in 2002, GE has invested over \$850 million in renewable energy technology and production. Today GE's Renewables business has an installed base of over 25 GW in more than 65 countries; employs over 4,700 people globally; and has created over 10,000 sub-supplier jobs.

Leading GE's growth in Renewables has been its investment and expansion in wind. Since 2002, our investments in technology have increased the reliability of our wind turbines by 12 points, from 85 to 97 percent, and improved their efficiency by 9 points, from 39 to 48 percent. We continue to make advances in areas such as blade and tower design. We have also invested in technology leadership in grid integration capabilities, such as low-voltage ride-through and reactive power control, to facilitate the reliable operation of wind power plants. Accompanying these investments in technology has been a substantial scaling up of our manufacturing and supply chain. We have tripled the number of US assembly facilities and increased wind turbine production six-fold, ramping our production rate from 10 per week to 13 per day.

As a result of these investments, over 10,000 of our 1.5-megawatt wind turbines have been installed worldwide. GE is the leading wind turbine supplier in North America, and nearly one out of every two wind turbines installed in the US is a GE turbine. We are investing in and positioning our solar and biogas businesses to achieve similar growth.

Our business growth has translated into new GE jobs—well-paid jobs requiring technical skills and training. In the US, we employ more than 2,000 people in our Wind and Solar businesses. These include wind turbine manufacturing jobs in Pensacola, Florida; Greenville, South Carolina; Salem, Virginia; Erie, Pennsylvania; and Tehachapi, California. They include solar manufacturing and professional jobs in Newark, Delaware and Golden, Colorado. And they include professional jobs at our headquarters in Schenectady, New York, where since 2007 we have added over 300 jobs in Engineering, Project Management, and Services to support our Wind and Solar businesses.

The growth of our installed base, meanwhile, has spurred unprecedented demand for skilled workers who can operate and maintain wind projects. GE's US wind installed base already supports 1,000 operations-related jobs annually.<sup>5</sup> These are long-term jobs, lasting the full life of a wind farm. The need for these workers is so strong that GE has developed training programs with several community colleges to ensure there is a trained workforce to operate and maintain our turbines when they come on-line.

Finally, our business growth is rippling through our US supply chain. When GE testified before the Congress in March 2008, we reported that our Wind business supported 2,000 jobs in 15 states. In just one year, our US supplier jobs have doubled to over 4,000. These suppliers manufacture a variety of wind components and subcomponents, including blades, towers, bedplates, nacelles, gearboxes, generators, bearings, castings, and cables.

In 2007, GE announced that two blade manufacturing companies would build new facilities in Aberdeen, South Dakota and Newton, Iowa to supply GE wind turbines, adding 1,250 jobs. The new TPI Composites facility in Newton, which opened last September and plans to employ 500 people, will play a critical role in driving the local economy, which previously suffered from the loss of 1,800 jobs at a nearby Maytag facility. The Newton facility was recently featured in the *New York Times* as an example of jobs emerging in the industrial heartland due to growing demand for wind turbine components.<sup>6</sup>

Iowa is both a compelling story about green-collar job growth—with 1,000 of these jobs added statewide in 2008<sup>7</sup>—and an example of the role that policy can play in attracting manufacturing by stimulating demand for renewable energy. Because the logistics costs of transporting blades, towers, and heavy wind equipment can account for 20 percent of the cost of a wind turbine, manufacturers prefer to locate facilities near demand. As a TPI employee pointed out in the *New York Times* article, "These are American jobs that are hard to

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<sup>5</sup> Based on GE internal data and Navigant Consulting, op. cit. note 2.

<sup>6</sup> Peter S. Goodman, "A Splash of Green for the Rust Belt," *New York Times*, 1 November 2008.

<sup>7</sup> Ibid.

export.”<sup>8</sup> Thanks to this logistical reality, a strong wind resource, and supportive state policy, the Midwest has become a wind turbine manufacturing corridor, and Iowa—the first state to impose a renewable generation requirement on state investor-owned utilities—has become the hub of this corridor.

We are optimistic that the story of Newton and the example of Iowa will be seen as the beginning of the emergence of a substantial domestic US renewable energy manufacturing base. In the past two years, wind turbine and turbine component manufacturers announced, added or expanded 70 facilities—55 of these in 2008 alone.<sup>9</sup> This facility growth can be largely attributed to the successive extensions of the Wind Production Tax Credit (PTC) in 2005 and 2006, which has given companies the confidence to invest in new manufacturing capacity. As a result, the US domestic content of wind turbine components— weakened by repeated PTC expirations in 1999, 2001, and 2003 and the accompanying drops in projects and manufacturing—is now trending upward. Between 2005 and 2008 GE more than doubled the number of turbines built in the US while increasing their US domestic content from 21 percent to 34 percent. We would expect this trend to continue if a long-term policy is established.

This need for a long-term policy has been magnified by the economic recession and financial crisis, which have rendered renewable energy tax credits ineffective. Last fall, there were 18 tax equity investors in the renewable energy market; today there are 4 active investors. This drying-up of project capital and resulting slowdown in orders for new wind and solar equipment have already caused several manufacturers and suppliers to announce layoffs or postpone their facility expansion plans. While Congress has taken commendable near-term steps to extend and modify these tax credit based policies in recognition of the current financial crisis, a long-term national commitment is now needed to provide industry with a longer time horizon for planning and runway for growth.

If Congress were to establish a Federal RES this year, GE would expect to see considerable growth in demand for its technologies. Responding

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<sup>8</sup> Ibid.

<sup>9</sup> AWEA, *op. cit.* note 1.

to this growth would in turn prompt us to explore the expansion of existing wind turbine assembly facilities and addition of new facilities; increased commitments to component suppliers and the addition of new suppliers; and the acceleration of US-based solar production. These commitments would stimulate thousands of new jobs within GE and its suppliers. For example, with a stable, long-term federal policy in place, GE can foresee the significant expansion of current blade and drive train supplier facilities, and investments in 4-6 new tower manufacturing facilities. These investments could result in the creation of approximately 3,000-5,000 new jobs to support our wind business. In addition, we are aware of 10 to 12 foreign suppliers who have expressed a strong interest in opening facilities in the US, but are awaiting a long-term policy signal.

We estimate that a Federal RES along the lines of Chairman Markey's proposal could, along with existing policies, support 100,000 new jobs between the end of 2008 and the end of 2012, with even greater long-term potential. But GE, like the renewable energy industry in general, is simply unable to undertake this degree of long-term planning and large-scale capacity commitments in the absence of a sustainable renewable energy policy.

#### **GE view on US renewable energy policy**

To date, US renewable energy policy has consisted largely of a combination of federal tax incentives and state-by-state Renewable Portfolio Standards (RPS). Although the renewable industry has achieved record growth in recent years, this policy approach is unsustainable due to:

- The current financial crisis, which has exposed the weaknesses of a tax-driven approach to energy policy;
- The short-term nature of federal tax credits, which has led to boom-bust cycles and inhibited planning for long-term expansion of the manufacturing base;
- The complexity created by a patchwork of state RPS programs that vary widely in design and effectiveness; and

- The absence of a long-term national policy “signal” to project developers and technology providers that must compete in an increasingly global renewable energy industry.

We believe the US has an enormous opportunity to stimulate both immediate and long-term US-based jobs in manufacturing, projects, and services through a broad renewable energy policy that addresses three priorities:

- First, immediate reform of existing tax incentives to make them effective in the current economic climate;
- Second, a multi-year extension of these tax credits to provide a bridge for long-term policy; and
- Third, a sustainable long-term policy in the form of a Federal Renewable Electricity Standard.

We applaud the Congress for its leadership in addressing the first two of these three priorities in the recently enacted American Recovery and Reinvestment Act of 2009. We believe that the temporary Treasury grant program for project owners to access the benefits of the renewable energy investment tax credit, and the creation of a new Department of Energy loan guarantee program to facilitate debt financing of these projects, are essential steps toward realizing the Obama Administration’s goal of doubling renewable energy use by 2011. The implementation details are, of course, critical and we look forward to working with members of Congress and the Administration to maximize the effectiveness of these new programs.

We also applaud the Congress and the President for providing our industry with a medium-term “bridge” to sustained growth through the three-year extension of the Wind PTC. With wind and solar tax incentives now in place through 2012 and 2016, respectively, our industry now has a path to near-term recovery. But even with an immediate fix and medium-term bridge, the US still lacks a long-term policy framework for renewable energy.

**GE view on a Federal RES**

GE believes that a Federal Renewable Electricity Standard is needed to ensure US leadership in renewable energy and motivate the sustained development of a US renewable energy industry workforce. A well-designed Federal RES would provide a long-term policy signal to the industry, generating both near-term job growth in construction and services and long-term jobs in domestic manufacturing. A Federal RES is also an excellent example of the “complementary” policies that will be needed alongside a cap-and-trade program to maximize the contribution of renewable energy to greenhouse gas emission reduction goals.

State Renewable Portfolio Standards have proliferated over the past several years. In 2002, 12 states had a mandatory RPS. Today, 28 states and the District of Columbia have a mandatory RPS while another five have renewable energy goals. Last year alone, six states added or strengthened state RPS programs. Of the 31 states represented on the Energy and Commerce Committee, 19 have a state Renewable Portfolio Standard, three have a renewable energy goal, and two are considering a new RPS. Of the seven states that have installed over 1,000 MW of wind<sup>10</sup>, six of them—Texas, Iowa, California, Washington, Colorado, and Oregon—are represented in this committee.

GE believes that that state Renewable Portfolio Standards have had a significant impact on the near-term deployment of renewable energy. Last year over 85 percent of new wind capacity was added in a state with an RPS or renewable energy goal. And 63 percent of the wind turbine manufacturing facilities that were announced or came online in 2008 were in an RPS state. We estimate that current state RPS requirements represent over 50 GW of wind and over 10 GW of solar PV between 2009 and 2025.

These State RPS programs do not add up to a national commitment to renewable energy development and job creation, however. Relying solely on state programs, in fact, could actually cause wind and solar growth to plateau over the next decade. But State RPS programs have

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<sup>10</sup> AWEA, op. cit. note 1.

provided both a spur to near-term growth and valuable “lessons learned” to inform the design of an effective Federal RES.

Based on our engagement and experience with State RPS programs, we identify seven critical “design elements” of a Federal RES:

- First, an aggressive long-term goal (2020-25) to motivate long-term planning beyond business-as-usual
- Second, achievable interim goals (beginning in 2012) to stimulate near-term deployment
- Third, meaningful non-compliance “teeth” to motivate behavior
- Fourth, use of Renewable Energy Credit trading to promote least-cost compliance
- Fifth, support for distributed solar and other renewable generation through a credit multiplier
- Sixth, preservation of a renewables-only standard, separate from standards for energy efficiency or advanced energy
- Seventh, compatibility with state RPS activity so that states remain empowered to adopt consistent but stronger measures

We note that Chairman Markey’s proposal, H.R. 890, reflects many of these design elements. As discussed below in further detail, however, separate legislation to expedite transmission expansion will also be essential to the success of a Federal RES.

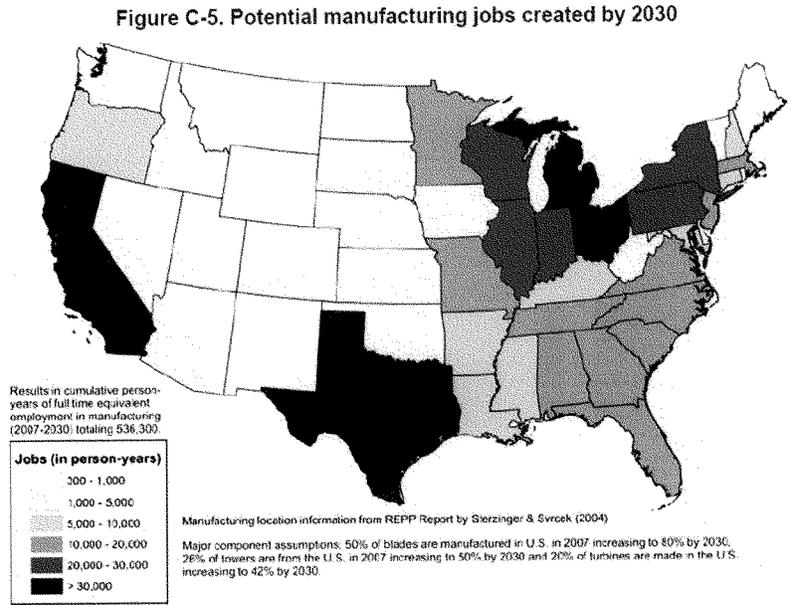
### **Economic impacts of a Federal RES**

The employment impacts of a Federal RES are likely to be substantial. In a 2008 study, the Department of Energy estimates that achieving 20 percent wind by 2030 would result in an installed base of more than 300 gigawatts of wind. This scenario would support 500,000 jobs in manufacturing, construction, operations, and related sectors. Many of the manufacturing jobs are in states that have recently experienced significant job losses, but “even states without a significant wind resource can be impacted economically from new manufacturing jobs (e.g. southeastern US).” (See Figure 1.)<sup>11</sup>

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<sup>11</sup> Data and Figure 1 from US DOE, *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to US Electricity Supply*, July 2008.

Figure 1:  
Potential wind manufacturing job impact of 20% wind scenario (2030)

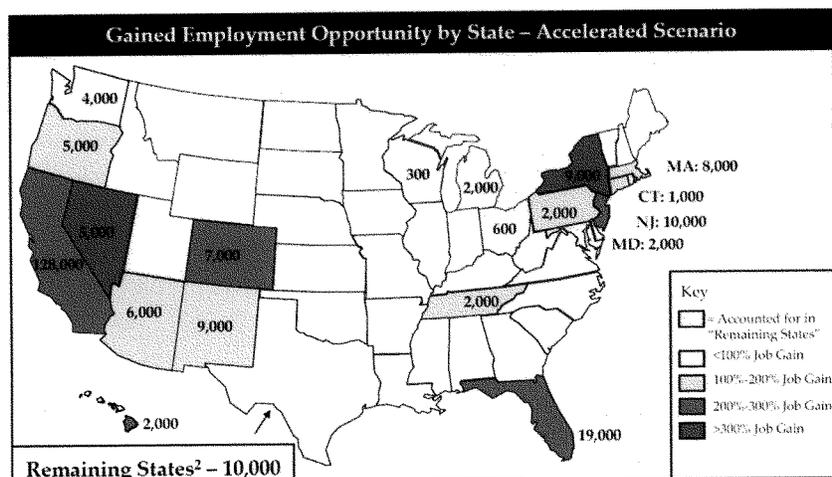


Source: US DOE 2008. Used with permission.

Similarly, the solar PV industry could support the installation of more than 22 gigawatts and 230,000 new jobs by 2016 under an “accelerated” policy scenario, according to a report from Navigant Consulting.<sup>12</sup> Here, too, job growth is not limited to regions with a strong solar resource, as demonstrated by the employment potential in the Pacific Northwest and Northeast. (See Figure 2.) While these studies do not look explicitly at the job creation impacts of a Federal RES, and they do not include other renewable energy sources such as concentrated solar thermal or biomass, they provide an indication of the industry’s job creation potential under a Federal RES.

<sup>12</sup> Data and Figure 2 from Navigant Consulting, op. cit. note 4.

Figure 2:  
Potential solar PV job impact of accelerated policy scenario (2016)



Source: Navigant 2008. Used with permission.

Opponents of a Federal RES argue that not all states have adequate renewable energy resources to meet potential RES requirements. The answer to this, we believe, is assuring the eligibility of a range of resources. For example, North Carolina's RPS has established special supports for solar PV and biomass resources such as swine and poultry waste. According to a Navigant Consulting report prepared for the state of Florida and the Lawrence Berkeley National Laboratory, the state has adequate renewable resource potential—including solar energy and biomass sources such as agriculture and forestry residues and energy crops—to provide as much as 18 gigawatts of capacity or 27 percent of utility retail sales by 2020.<sup>13</sup>

Federal RES critics point to the potential cost impact, particularly the effect on electricity customers. To date, however, the price impacts of state RPS programs have been modest. According to the National Renewable Energy Laboratory, state RPS policies contributed to rate increases of 1 percent or less in 2007—a number that is biased upward

<sup>13</sup> Navigant Consulting, *Florida Renewable Energy Potential Assessment*, Prepared for Florida Public Service Commission, Florida Governor's Energy Office, and Lawrence Berkeley National Laboratory, 24 November 2008.

as it ignores the potential role of renewable energy in reducing natural gas and wholesale electricity prices.<sup>14</sup> According to a 2007 study from the Energy Information Administration, a Federal RES of 25% by 2025 would lower natural gas expenditures by 1%, for a total reduction of \$17 billion. These savings more than offset the increase in electricity prices of 0.4%, which increases expenditures by \$15 billion, leading to a net consumer savings of \$2 billion.<sup>15</sup>

### Interaction with climate legislation

Discussion of the costs and benefits of a Federal RES must also be considered in the context of greenhouse gas emission reduction. GE is a member of the US Climate Action Partnership, an alliance of 30 businesses and environmental groups that supports an economy-wide, market-driven approach to climate change that includes a cap-and-trade program as a core element. In a set of consensus recommendations released in January, US CAP members state that

*... policies and measures that are complementary to a cap-and-trade program are needed to create incentives for rapid technology transformation and to ensure actual reductions in emissions occur ... where market barriers and imperfections may prevent the price signal from achieving significant reductions in emissions within those sectors.<sup>16</sup>*

In our view, a Federal RES is an excellent example of the complementary policies needed to provide incentives for continued technological improvement and near-term emission reductions. Along with energy efficiency, renewable energy is widely viewed as one of the most promising near-term climate stabilization “wedges.” The DOE’s 20 percent wind scenario, for example, would reduce cumulative emissions of over 7,600 million metric tons of CO<sub>2</sub> by 2030 and over 15,000 million tons of CO<sub>2</sub> by 2050. This would nearly level projected

<sup>14</sup> Ryan Wiser and Galen Barbose, *Renewables Portfolio Standards in the United States*, Lawrence Berkeley National Laboratory, April 2008.

<sup>15</sup> Energy Information Administration (EIA), *Energy and Economic Impacts of Implementing Both a 25-Percent Renewable Portfolio Standard and a 25-Percent Renewable Fuel Standard by 2020*, August 2007.

<sup>16</sup> US Climate Action Partnership (US CAP), *A Blueprint for Legislative Action: Consensus Recommendations for US Climate Protection Legislation*, January 2009.

growth in CO<sub>2</sub> emissions from the electricity sector.<sup>17</sup> A Federal RES, by accelerating the near-term deployment of wind and other renewable energy, is thus a sensible down payment on future climate legislation.

### **Transmission and siting challenges**

Two additional challenges confronting the long-term growth of the US renewable energy industry are transmission and siting. Some of our best indigenous renewable energy resources exist in remote locations and require new, long-distance transmission lines to be accessed. The long-term goals of a Federal RES simply cannot be met without a concerted national commitment to new transmission infrastructure analogous to our nation's investment in an interstate highway system. As noted in a recently-released White Paper on "Green Power Superhighways"<sup>18</sup> developed jointly by AWEA and SEIA, many of the barriers to transmission expansion to access renewable energy are not technical but policy-related. Key recommended policy solutions fall into three areas:

- Interconnection-wide transmission planning, specifically the development of regional transmission plans by the Western and Eastern Connection;
- Interconnection-wide cost allocation and certainty for cost recovery, specifically the regional development and federal approval of plans that allocate costs across all load-serving entities on an interconnection-wide basis; and
- Federal siting authority, specifically FERC approval and permitting for specific extra-high-voltage facilities defined in the regional plans as needed to meet renewable energy goals.

Our industry must also continue to work with environmental groups and government agencies to ensure that future renewable energy transmission and generation projects are planned and sited in an environmentally-sound manner. One major need in this regard is better scientific understanding of the potential impacts of future projects. As one step in this direction, GE recently became a founding

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<sup>17</sup> US DOE, *op. cit.* note 11.

<sup>18</sup> AWEA and SEIA, *Green Power Superhighways: Building a Path to America's Clean Energy Future*, February 2009.

member of the American Wind Wildlife Institute. This Institute, on whose Board I serve, is an industry-NGO science-based collaborative aimed at facilitating the timely and responsible development of wind energy while protecting wildlife and wildlife habitat through research, mapping, mitigation, and public education on best practices on wind farm siting and habitat protection.<sup>19</sup>

### **The global challenge**

Adoption of a Federal RES will do much to help the US catch up with Europe in renewable energy manufacturing and job creation. GE is presently the only major domestic US wind manufacturer, with European companies accounting for the majority of the remaining industry leaders. This European manufacturing advantage can be traced to a long-term stable European policy environment, which is based on the region's early recognition of the job creation potential of the renewable energy industry and the importance of creating strong domestic markets to develop this industry.

Since the 1990s, Europe—led by Denmark, Germany, and Spain—has made substantial long-term commitments to wind through predictable, stable feed-in tariffs—lasting up to 20 years—that stimulated demand for renewables and allowed their domestic manufacturers to grow to meet this demand. Over time, wind penetration grew and companies expanded and began to export. Today, wind power's share of electricity is 19 percent of electricity in Denmark, 10 percent in Spain, and 6 percent in Germany. Danish, Spanish and German firms figure prominently among leading wind manufacturers and developers.

According to the German Wind Energy Association (BWE), the German wind industry directly employs more than 100,000 people—as a share of national population, more than four times the US total. In 2007 it accounted for 37 percent of global wind turbine and component manufacturing and generated 6 billion Euros in exports in 2007, making it the nation's second leading export industry after automobiles. The key to this industrial success is domestic policy; as the BWE states, “a

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<sup>19</sup> American Wind Wildlife Institute, “20 Leading Environmental, Conservation & Wind Energy Groups Launch New Institute,” press release, 19 November 2008.

stable domestic market is of the utmost importance" for creating industry jobs and exports.<sup>20</sup>

The European Union is now stepping up its regional commitment to renewables, recently adopting a Directive of 20 percent renewable energy by 2020. This binding directive is expected to result in yet another wave of feed-in tariffs, market stimulation, job growth and exports. The EU is also repeating its policy success in wind with solar power; Europe leads the global solar PV market and is developing a regional solar manufacturing base.

Other countries are following Europe's lead. Remarkably, over 65 countries worldwide now have national targets for renewable energy<sup>21</sup>—but the United States is not among them. Many of these countries have major aspirations for deploying renewable energy as a source of industry development and job growth.

No country exemplifies grand renewable energy ambitions more than China, which publicly aims to become a global hub for wind turbine manufacturing. This past December the Chinese government tripled its national goal for wind from 30 GW to 100 GW by 2020. The country is currently projected to surpass the US in annual wind installations as early as 2010. An important driver of this growth is a national "Mandated Market Share" policy, which requires power generators and grid operators to devote a growing percentage of their power to renewable energy source. In effect, China has already adopted a policy similar to a Federal RES.

This accelerating global political momentum toward renewable energy means that a national commitment is no longer an option but a necessity if the US seeks a leadership position in the industry. As I stated at the beginning of my testimony, GE believes that a Federal RES is the single most important step that Congress can take to lay the long-term foundation for a sustained green-collar workforce and a domestic renewable energy manufacturing base. And by accelerating

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<sup>20</sup> German Wind Energy Association (BWE), "Wind Energy in Germany," <http://www.wind-energie.de/en/wind-energy-in-germany/>.

<sup>21</sup> Based on REN 21, *Renewables 2007 Global Status Report*, February 2008 and REN 21, "WIREC 2008 Pledges," <http://ren21.net/wiap/wirec.asp>.

the near-term deployment of commercially available technologies to reduce greenhouse gas emissions, a Federal RES will serve as a critical complement to future climate change legislation.

Thank you for holding this important hearing, and for the opportunity to present this testimony. I look forward to your questions.

Mr. MARKEY. Thank you, Mr. Lowe, very much, and that completes opening statements from our witnesses. The chair will recognize himself for a round of questions.

Mr. Gruenspecht, there has been some opposition to a national renewable electricity standard from parts of southeastern United States based on the argument that the Southeast lacks renewable resources. Your analysis last year showed that the Southeast was actually a net exporter of tradable electricity credits because of the huge biomass resource there. In other words, the standard allowed southeastern states to actually export renewable credits instead of just importing coal. A lot of biomass use was mill and other waste that would have rotted on the ground if not used to satisfy the standard. Can you expand upon what your analysis found?

Mr. GRUENSPECHT. Yes, Mr. Chairman. Again, we looked at analysis at 15 percent RPS. I guess we got a letter from you yesterday and we are going to do further analysis on your standard. But we did on a region-by-region basis look at what would happen, I think it was a proposal by Senator Bingaman, and we did find that at least initially up until about 2020, the SERC region, the Southeast Electric Reliability Council region, was able to generate more renewable credits, if you will, than it used internally. Beyond 2020, they did import some of their renewable energy credits but they still produced about 80 percent of what they needed within the region. It did not break down to State-by-State levels.

Mr. MARKEY. Thank you, Mr. Gruenspecht.

Mr. Izzo, do you believe that a 25 percent renewable electricity standard by 2025 is feasible in New Jersey and nationwide?

Mr. IZZO. Yes, I do. In New Jersey our primary focus will be offshore wind, onshore wind through PJM and local solar, and as you have already been told, the NREL map suggests that New Jersey has less of an abundance of those resources than other parts of the country.

Mr. MARKEY. Mr. Binz, what about Colorado? Do you think you could meet 25 percent by 2025?

Mr. BINZ. Our current standard is 20 percent by 2020. I think 25 percent by 2025 will be a stretch but I think we will make it.

Mr. MARKEY. Mr. Lowe, if we delay in adopting a national policy such as a renewable electricity standard to encourage growth in renewables, is there a risk that other countries will end up dominating this growing global market in terms of control of this international market that is clearly going to be there by 2020 or 2025?

Mr. LOWE. Absolutely. We see national renewable standards being adopted around the world. A highlight, too, number one, is the 20 percent renewable energy in Europe by 2020. That is expected to drive almost 200 gigawatts of wind installation there. The second one that I highlight is China. China used to have a goal of 10 gigawatts by 2020. They expanded that to 30 gigawatts by 2020. Last year they expanded this to 100 gigawatts by 2020.

Mr. MARKEY. That is 100,000 megawatts?

Mr. LOWE. That is 100,000 megawatts.

Mr. MARKEY. That is how much nuclear energy we produce on a daily basis in the United States.

Mr. LOWE. So as is said here, we have the potential for 60 gigawatts of wind in the United States based on the current state RPSs but that is dwarfed by these two other regions.

Mr. MARKEY. So based upon that, the Chinese industrialists hope we don't adopt a renewable electricity standard?

Mr. LOWE. I think you can look at a quote that came out of Germany by the German Wind Energy Association. Just so everybody knows, Germany ends up supplying about 37 percent of all wind turbines or components around the world, and that is because according to the state, they have a very strong domestic policy standard that ends up driving that industry and therefore they can export. As an example, Wind Products is the second greatest exporter out of Germany, about 60 billion euros a year, only to cars.

Mr. MARKEY. I think that the Germans and the Chinese are hoping we don't have a renewable electricity standard, to be honest with you, because we would be importing their products by 2020 and 2025 and the work would be in their countries, not in ours.

Mr. IZZO, you have testified that a national renewable electricity standard would complement and strengthen climate legislation and be workable in concert. Could you elaborate upon that?

Mr. IZZO. Sure. Under a cap-and-trade system, what you would have is a cost for carbon which would then encourage all other forms of carbon reduction, in particular things like energy efficiency, greater improvements in current fossil fuel-fired-powered plants to increase their energy output per amount of CO<sub>2</sub> emitted. However, such a climate change bill would not bridge the gap that is needed to bring about the longer term solutions that renewables are. So that would require a special portfolio selection that says in order to build the full portfolio of solutions, not just energy efficiency, not just more efficient fossil fuel plants but carbon-free power. One simply needs to look at the fact that 76 percent of all renewables produced in 2007 were in RPS States.

Mr. MARKEY. Thank you, Mr. Izzo, very much. That is very helpful.

My time has expired. The chair recognizes the gentleman from Michigan.

Mr. UPTON. Thank you, Mr. Chairman. Again, I want the record to show that I do support an RPS. We have it in Michigan, and we will see how it works. It was just approved by our State legislature. We didn't have to go to the voters. Our legislature did it. We are anxious to see how it works, and I must say that last week I spent a considerable amount of my time at two of our universities, who are really working on wind technology to make it better, and an interesting point, you know, in Michigan we have got a lot of storms, as you know, that come across the lake, and when I went out to one of these giant wind turbines, it wasn't turning, not at all because the wind was not blowing last week, and so my question is, as much as we want renewable sources of power—and it was a cloudy day too so solar wouldn't have worked either. What do you have to do in terms of building for the non-peak times or when the wind doesn't blow and the sun doesn't shine, which in Michigan is a good part of the time. Mr. Izzo?

Mr. IZZO. Sure, Congressman. We advocate three forms of energy policy to achieve carbon reduction. One is energy efficiency, two is

renewables and third is large baseload clean carbon-free technology, which could either be fossil fuel with carbon capture and storage or nuclear. We are also investing in compressed air energy storage systems, which allow us to store electricity from renewable supplies when it is produced and then use it when it is needed. One has to take an entire portfolio approach to this. No one slice of that will achieve our 80 percent reduction by 2050.

Mr. UPTON. Mr. Binz, what has Colorado done for the non-peak times?

Mr. BINZ. Congressman Upton, we are grappling with that very issue. The wind penetration in Colorado is pushing 20 percent on a capacity factor. If you are an Excel energy customer, one kilowatt-hour out of 10 in 2008 was wind generated. That presents some challenges but they are obviously able to solve those challenges to regulating and balancing the system. We use a number of resources such as pumped hydrostorage, natural gas peaking units to firm up the wind, but still in all, that is a lower cost total application than would be using to burn natural gas alone, so we come out ahead in that. The other thing I would mention is that regional diversification is very helpful. We are looking right now at the advantages of bringing in wind from other states that happen to have patterns which tend to complement the Colorado wind resources. That is another approach you can take.

Finally, I want to endorse the storage notion. CAES, or compressed air energy storage, is going to be very important to the future of wind and a comparable but different technology for solar will make those dispatchable units in the off-peak and shoulder periods.

Mr. UPTON. Mr. Lowe, I am told, I would like you to confirm this, that it takes about 60 acres, is that right, in terms of space for wind to produce one megawatt of power? Is that about right?

Mr. LOWE. I would say it is a little bit less than that.

Mr. UPTON. A little bit less?

Mr. LOWE. Approximately.

Mr. UPTON. Fifty acres?

Mr. LOWE. Forty, I believe.

Mr. UPTON. Forty? Okay. So to provide 5 percent of our Nation's power using wind, and again I support wind, I support wind in Lake Michigan. I know we have a problem with Nantucket in Massachusetts when they didn't want it. My district is along Lake Michigan. How many acres would it then take?

Mr. LOWE. I am sorry. I don't have that statistic with me.

Mr. UPTON. We figured it was 12 billion acres, I think, is the figure that we came up with so we might have to encroach into Nantucket after all. I don't know if the gentleman is willing to acknowledge that or not. That is a lot of acreage to reach 5 percent. You know, we don't have the great ski mountains of Colorado in Georgia or other places that we are going to be able to use a lot of that acreage, but that is a heck of a lot, right?

Mr. LOWE. I would have to go back and check that number but certainly if you take a look at the areas of the country where wind is predominant, and one of advantages of it is in large swaths of the Midwest where you are still using that land for very vibrant agricultural use and yet you are also being able to produce renew-

able energy. One of the byproducts this really has is, the support from farmers. We know that a number of farms right now are in desperate financial condition and the leasing payments that they get by being able to put those wind farms on their property while also enjoying—

Mr. UPTON. I understand. I want to ask one last question before my time runs on.

Mr. Binz, again, knowing Colorado a little bit, does Colorado include hydro as part of your portfolio?

Mr. BINZ. RES includes new hydro.

Mr. UPTON. New hydro. So existing hydro, it doesn't impact that at all then, right?

Mr. BINZ. Actually our hydro opportunities are relatively modest in Colorado. This is where the rivers start, not where they end up, and so—but we do allow in our renewable energy standard new hydro.

Mr. MARKEY. The gentleman's time has expired. The chair recognizes the gentlelady from California, Ms. Matsui.

Ms. MATSUI. Thank you, and you know, we all know that preventing climate change will require many strategies. We need climate legislation that caps carbon emissions. We need a federal renewable electricity standard that drives the deployment of renewable energy and stimulates further innovation and we need to focus on the easiest and least expensive emissions reductions, and that means major energy efficiency standards. In 2007, the House passed a renewable electricity standard and it required utilities to generate 15 percent of their electricity from renewable sources. I voted for this bill because I think it was the best we could have passed at the time. But this bill included provisions allowing 4 percent of the 15 percent of the standard to come from energy efficiency improvements. I am a strong supporter of dramatically improving energy efficiency. The question I have is, how to address renewable energy with energy efficiency policies.

Mr. Izzo, do you think energy efficiency investment should be counted under a federal renewable electricity standard?

Mr. IZZO. No, I see them as separate issues, equally important.

Ms. MATSUI. So you are concerned that including efficiency in RES standards would just allow efficiency to displace—

Mr. IZZO. Correct. You would diminish the necessary deployment we need for renewables.

Ms. MATSUI. Mr. Binz, how about you?

Mr. BINZ. I feel the same way. I would rather not reduce the effectiveness and I would add to that list. We are strong supporters, Governor Ritter in Colorado, strong supporters of research and technology having to do with clean coal. We would not want to see that defined as a renewable energy resource because it would work against the purposes of that bill but we think on a separate track those are very important policies as well.

Ms. MATSUI. Mr. Lowe, how about you? Does GE support separate standard for renewable and efficiency or a combined standard?

Mr. LOWE. I think it can be done either way but the one thing I would caution is, if you end up setting a standard and then you do not have a clear, articulated basis for what can renewables end up providing, then you are not going to see the investment and the

job creation there. So there has to be a certainty of that and the larger portion you allow to be satisfied by other technologies, the fewer jobs you are going to create, the fewer renewable penetration you are going to have.

Ms. MATSUI. Thank you, because your answers give us something to think about, because whether or not to separate energy efficiency from renewable electricity standard is an issue that we really definitely have to consider.

I want to ask you also about rates. We have talked a little bit about that. I want to step back and get a sense of what the panel feels on integration. Twenty-eight States plus the District of Columbia now have mandatory RPSs, and California, as I said, has led the way, and we have heard also about Colorado and the good work. But I would like to hear some of your thoughts about how to integrate all this into various State plans moving forward.

Chairman Binz, your State has done really excellent work. How has your State coordinated with other States on best practices and renewable goals?

Mr. BINZ. Well, I have several answers to that. We have been talking with regulators and air offices, environmental regulators in a number of States around the West. We are interested in unifying our transmission grid. We are right now improving transmission between Wyoming and Colorado. We have plans for improving transmission to the Southwest as well to New Mexico and Arizona for the purpose of making that an integrated market for these resources. So that is very important that we work with our neighbors on this.

You asked about rates. That is something very important, I think. Before I was named Public Utilities Commission chairman, I did a study predicting what the Colorado renewable energy standard would meet to costs in their State. It turns out I was pretty close to right. We have met the standard. Actually our utilities are ahead of the standard and the cost differential is less than 2 percent. It is about 1.6 percent at the moment, between what could have been built using traditional resources compared to what was built using renewable resources.

Ms. MATSUI. Thank you, and I think I have used up my time.

Mr. MARKEY. The gentlelady's time has expired. The chair recognizes the gentleman from Texas, Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman. Before I ask my questions, I am going to read a paragraph from Dr. Apt's statement or paper that he wrote because we are here debating a renewable energy standard because we think that there is a theory that man-made emissions, primarily from fossil fuels like coal, which reduce amounts of CO<sub>2</sub>, are causing climate change, i.e., the temperature to rise, and one of the solutions being proposed is an RES that is going to rely fairly heavily on wind power, which obviously doesn't create CO<sub>2</sub>. I am going to read a paragraph which is if true very ironic, and this is from Dr. Apt's paper and I quote: "Wind energy is a finite resource. At large scale, slowing down the wind by using its energy to turn turbines has environmental consequences. A group of researchers at Princeton University," which is in New Jersey, parenthetically "found that wind farms may change the mixing of air near the surface, drying the soil near the site. At planetary

scales, David Keith, who was then at Carnegie Mellon, and coworkers found that if wind supplied 10 percent of expected global electricity demand in 2100, which is a number of years off, the resulting change in the earth's atmospheric energy might cause some regions of the world to experience temperature change of approximately 1 degree Centigrade," which I think is about 1-1/2 degrees or 1.6 degrees Fahrenheit. Now, wind is God's way of balancing heat. Wind is the way you shift heat from areas where it is hotter to areas where it is cooler. That is what wind is. Wouldn't it be ironic if in the interest of global warming we mandated massive switches to energy, which is a finite resource, which slows the winds down, which causes the temperature to go up? Now, I am not saying that is going to happen, Mr. Chairman, but that is definitely something on the massive scale—I mean, it does make some sense. You stop something. You can't transfer that heat and the heat goes up. It is just something to think about.

Mr. Izzo, you are our utility representative but you are not officially representing the views of EEI, are you?

Mr. IZZO. No, that is correct. I am not here representing EEI.

Mr. BARTON. Okay. Now, I have been told to paraphrase your company's position is to say we have to, because of these renewable mandates in our service territory, we think the rest of the country ought to have to do it too. Is that a fair assessment or is that an unfair characterization?

Mr. IZZO. That is an unfair characterization. We are not here advocating New Jersey national security or New Jersey climate change. We are here recognizing the importance of national energy security and global climate change.

Mr. BARTON. And doing it very well, I might add.

Mr. Binz, you at the very end of your answer to Ms. Matsui indicated that Colorado has been able to implement its RES with almost no cost increase. That is very commendable and somewhat amazing based on the testimony and the material that I have from other sources that show going to a massive RES is going to require cost increase of anywhere from 20 percent to 50 percent. Could you supply the committee in writing with how Colorado has been able to—I don't doubt what you said is true because you seem like a pretty credible guy to me—

Mr. BINZ. In fact, Mr. Barton, it is the law in Colorado. There is a 2 percent ceiling on the cost differential that can be achieved as we meet our renewable energy standard.

Mr. BARTON. Would you support such a component of a federal law, that there be a cost cap factor in it?

Mr. BINZ. I haven't really thought about that. I think that is something you may want to look at.

Mr. BARTON. Well, think about it, because if we are going to do this and the Majority is big on caps, I think a cost cap might be a component of it.

Mr. BINZ. I will be happy to supply the report I showed doing a modeling of that but also I will supply what the Commission has found in its borders.

Mr. BARTON. In my last 1 second, Mr. Wise, could you comment on the cost of transmission to move wind energy from the Midwest to your region of the Southeast?

Mr. WISE. If the State of Georgia, if the ratepayers that I am elected to protect have to pay for the transmission of wind from the Midwest to Georgia, we think it would be just astronomical. It is just not an affordable project that we could sustain.

Mr. BARTON. Let the record show, Mr. Chairman, astronomical in Texas means a big increase. Thank you.

Mr. MARKEY. The chair recognizes the gentleman from Texas, Mr. Gonzalez.

Mr. GONZALEZ. Thank you very much, Mr. Chairman. Something that really stood out in Mr. Binz's testimony on page 6, "Renewable Energy Systems of America relocated from Texas to Colorado in March 2008. The company designs, builds and operates wind farms." Next bullet: "Texas-based Dragon Wind will open a plant in Lamar, Colorado, to build wind towers." The question, Mr. Binz, are you finally going to like Texans?

Mr. BINZ. We have always liked Texans, sir. They are probably our best ski immigrants.

Mr. GONZALEZ. I am from San Antonio. We have a municipally owned utility obviously, CPS Energy, and in discussing with them renewables, this is what they reported to me, and I have known for some time and I commend them but we are in a very special situation in San Antonio. "CPS Energy's goal is to achieve renewable energy capacity equal to 20 percent of our customers' peak electrical demand by 2020," so when we are talking about 15 in 2020, Tom Udall last year, it was doable. Twenty in 2020 is going to be doable probably. Twenty-five in 2025, like you said, it is not the easiest thing but probably doable for San Antonio. Among municipally owned utilities, CPS Energy ranks number one nationally in wind capacity. I don't think I have to tell you where Texas ranks as a State. CPS Energy is currently evaluating proposals from a number of companies interested in bringing up to 100 megawatts of solar power to San Antonio, enough to power about 23,000 homes. The plant could begin providing solar-generated electricity to customers in greater San Antonio by late 2010 or early 2011. So when I think in terms of standards in renewables, my district probably will fare all right. My concern is those that have been expressed by my colleagues from other States, whether it is Michigan, Illinois, Pennsylvania, Georgia. Now, Mr. Wise has indicated that there may be problems that San Antonio would not experience, but by the same token, I do want to point out that San Antonio has invested at this point about \$240 million just in the license application for a new nuclear plant that we just built, a state-of-the-art coal-fired plant, so we all over the place but nevertheless on the renewables we know exactly what the future holds. But we still have a vested interest in clean coal technology, tremendous interest in the development of new nuclear power plants, but what I am asking is, what about Mr. Wise? How do you respond to his testimony? I know you may have touched on it and I apologize because I had to absent myself from the hearing for a few minutes. This is what he states on page 2: "On the other hand, establishing a uniform RPS focused exclusively on a limited number of sources like wind, solar, biomass or get without regard to crucial regional differences will unnecessarily drive up electricity costs, jeopardize reliability and divert capital that will be needed to achieve other objectives like meeting

aggressive carbon targets. As a result, my State and our region must seek to encourage the growth of research and development in the use of energy resources that are available and economically viable to provide for our future needs." And I would ask all the witnesses, if you were in Mr. Wise's shoes today, how would you respond to your testimony as well as his observations and his description of his predicament? I can start with Mr. Binz, who is getting all the Texas commercial business.

Mr. BINZ. Congressman Gonzalez, Texas was an early leader in wind, and I think also the analysis that was done, the so-called REZ regions, the renewable energy zones that were identified so that transmission could be matched to those zones. That is important model that has been carried lots of other places and we do appreciate that as an important expert from Texas, the idea.

I would say that many of the arguments are very reminiscent of what we heard in Colorado before we got busy and figured out how to build a renewable energy industry. I know that there is reluctance to do this by utilities who have had a very traditional approach for a very long time and we had such utility in the State. They opposed the voter initiative. Two years later they supported the doubling of the requirement. Much has been said about biomass in the Southeast. I have also noted in here in my testimony significant solar potential in the Southeast. Biomass doesn't have to be new plants burning only biomass. Cofiring of coal is an excellent way of using biomass, and it is my understanding you can cofire up to about 15 percent of the input feed to a coal plant without losing any significant efficiency of that plant. That is the place to start. If a State is unable at the very beginning of this to actually put an industry on the ground, they can buy renewable energy credits. They can say we actually own wind being produced in Kansas or North Dakota and credibly count that against their requirement in their State. That is not the permanent solution because you do want to grow renewable industry in your State. But I just would exhort States who have not done this to look at the experience of Colorado, and there are lots of other examples of this, of where you are going to turn your economy around with respect to this issue, find that you have opportunities you never understood you had. Governor Ritter's promise of a new energy economy in Colorado has come true and has overridden the skeptics, who thought that we couldn't do it. I think the same can be done in many other places.

Mr. GONZALEZ. There is only about 29 seconds, Mr. Izzo.

Mr. IZZO. What I would say is, if I begin with the premise that we need to reduce 80 percent of our carbon emissions, there are going to be a series of solutions that are critical and one part of the region achieves competitive advantage by reducing its carbon footprint through more efficient coal units and therefore attracts to it the revenues from a cap-and-trade system, or another region of the country achieves a competitive advantage by having an indigent source of renewable, be it wind or solar. That is all part and parcel of a vibrant interstate commerce system and it is something that we should applaud and strive to achieve, every part of the country doing its bit to reduce carbon. Remember, 25 percent renewable portfolio standard, 35 percent of CO<sub>2</sub> from electricity, we

are talking about 7 percent of the 80 percent coming from this RPS.

Mr. BUTTERFIELD [presiding]. The gentleman's time has expired. Thank you very much.

Well, a logistical problem has developed. We have been called to the Floor for two votes. I am going to recess the hearing and ask the members to return 10 minutes after the second vote. The committee is in recess.

[Recess.]

Mr. BUTTERFIELD. All right. The committee will be back in session. At this time the chair will recognize the gentleman from Mr. Florida, Mr. Stearns.

Mr. STEARNS. Thank you, Mr. Chairman. I ask unanimous consent that my opening statement be made part of the record.

Mr. BUTTERFIELD. Very well.

Mr. STEARNS. Coming from Florida, some of our utilities are concerned about a possible bill from our Chairman Markey, particularly in light of that it doesn't include anything about clean coal or nuclear or waste-to-energy and there is not even a clear understanding whether we are going to have energy efficiency as part of it. I think a question I might have for Commissioner Wise is, if we assume that many utilities will fall short of the RES mandate and end up paying millions of dollars in noncompliance fees, won't that cost the customers and hurt the economy? Why do RES supporters claim that this is good for the economy?

Mr. WISE. I think it does actually help the economy with new jobs and growth and opportunities in the new technology but ultimately the ratepayers do pay the difference in our States where we are regionally challenged with lack of resources, and if you don't give us credit for the new nukes or efficiencies, then ultimately it is going to be a substantial wealth transfer from the southern states and ultimately cost us jobs, growth and industry, and be a significant cost to the ratepayer.

Mr. STEARNS. In January, T. Boone Pickens, I was at a symposium where he indicated that the cost per barrel is going to go up even higher than it was of \$150 a barrel, it might go up to \$200. So with the possibility the next 2 or 3 years the cost of gasoline going up and then you assume that you add all these extra costs, it is going to be enormous cost, as you pointed out, to the customers. Now, some dismiss the argument that the RPS will result in a wealth transfer from areas of this country that lack renewable resources to those that are blessed with them. As a State regulator, can you explain why you believe a federal mandate will result in increased rates for those in the Southeast?

Mr. WISE. Again, you know, we even heard from Commissioner Binz just a few moments ago that he was talking about these credits that we could buy to go ahead and take credit for wind and solar from other parts of the country, but ultimately if they are not generated in our State and we are paying credits just to acquire them, then once again it just adds cost to our system. We take great pride in going ahead in the southern states to have reliable, affordable energy and so we have done our job with transmission lines. We are not constrained, as many other parts of the country that have not paid their way, and so at this point we are talking

about adding, you know, real dollars to our ratepayers if we are required to buy these credits to offset what we simply can't meet under the standards being discussed by this committee and this Congress.

Mr. STEARNS. Let us assume you and Florida, Georgia and Florida, have to do this. A lot of money from our States are going to go outside our States too, which would have an impact. Georgia has nuclear power?

Mr. WISE. Yes, sir, we do, and we are currently considering two new plants to be sited where we have a reactor today.

Mr. STEARNS. It is puzzling to me that if the folks are considering this RES, want clean energy, why they wouldn't consider nuclear power. It is produced in the United States. It has zero carbon dioxide emissions. It does not put stress on the agricultural community, the timber industry. So why in your opinion have they not considered nuclear power?

Mr. WISE. Again, it might be agenda driven. I really believe that if somebody is promoting a new technology and they can benefit from it with jobs and growth and industry in their region, they are not going to want to give credit for efficiencies for new nuclear power, and I think it is unfortunate. These do take care of the emissions issues for at least 2,200 megawatts that we are talking about adding to Georgia's load.

Mr. STEARNS. If you meet all the requirements of clean energy, you would think you would get some credit for it. Do you agree that as it now stands, our country's transmission infrastructure is woefully inadequate to achieve a 20 percent by 2021 RPS requirement?

Mr. WISE. Yes, I do.

Mr. STEARNS. How much backup power from conventional power plants is needed to meet a 20 percent RPS requirement by 2021, and if you know the cost?

Mr. WISE. The cost would add probably 15 percent, is the way we are looking today, just to add the backup cost to the shortfall that if we say put in wind and/or solar, we are going to see upwards of 75 percent backup probably from natural gas.

Mr. STEARNS. Thank you, Mr. Chairman.

Mr. BUTTERFIELD. Thank you. The gentleman yields back. At this time the chair will yield 5 minutes to himself.

Let me thank all of you for coming out today to be a part of this hearing. On behalf of the chairman, we certainly thank you very much. I understand that Mr. Wise may have to depart for the airport somewhere around 1:00, but let me assure you that this hearing will probably be completed by 1:00. We are told that our next vote will be at or about that time, but thank you so very much.

Let me join my colleagues on this committee and the full committee who support an RES. Some call it the RPS. I am not sure which acronym is more preferable to my office, but thank you for speaking on the subject today. But I am terribly concerned. I join those who have expressed concern and I too am terribly concerned about a national standard. I represent North Carolina. I am part of the Southeast that you hear so much about. North Carolina has developed a State standard, the only one in the southeastern part of the country. We have a State standard which is 12.5 percent.

To the gentleman representing the Department of Energy, the acting administrator, and I won't call you by name, because quite frankly, I can't pronounce it, but let me address this question to you. In your testimony earlier you mentioned an analysis that the Department of Energy has made. Would you elaborate further on that?

Mr. GRUENSPECHT. Yes. These were earlier analyses of earlier proposals. In June 2007, in response to a request from Senator Bingaman, we looked at a 15 percent RPS. Also, later that year in response to a request from, I think it was the ranking on Resources, the ranking on Ways and Means and the ranking on, I think Energy and Commerce as well, we looked at provisions that were in the House version of legislation that ultimately became the Energy Independence and Security Act. Those are all available on our web and we can certainly make them available to the committee. Let me make clear, those are not analyses of the proposal that Mr. Markey and I believe Mr. Platts have put out. We did receive a letter yesterday from Mr. Markey requesting that we undertake an analysis of that proposal, and we will do that as best as possible.

Mr. BUTTERFIELD. But do you at least concede that the Southeast is extremely limited with respect to wind and solar? Do you make that concession?

Mr. GRUENSPECHT. Sure. We got very little—biomass was the key resource in the South for increasing renewable generation both through cofiring in existing plants, as discussed by some of the other panelists, and in dedicated plants. A little bit of solar came in as well. But again, biomass was the main thing.

Mr. BUTTERFIELD. And of course, our concern in the South is, how on earth are we going to find this biomass in order to satisfy the standard? I mean, we certainly want to be good Americans and play a valuable part in this process but where on earth are we going to find the biomass to meet the standard?

Mr. GRUENSPECHT. Well, we have worked with the University of Tennessee actually on the regional supplies of the biomass and again, this is not with respect to the standard proposed by Mr. Markey but with these earlier standards. We did find that there is a fair amount of biomass available both from forest residues, possibly from energy crops. It is more expensive than coal but in the case of the analyses of those standards, it was brought into use.

Mr. BUTTERFIELD. It is going to be extremely difficult. Would you agree, Mr. Wise?

Mr. WISE. I would indeed, and clearly a sustainable—if we did it all on biomass alone, it would take—we have heard some numbers. To make the 20 percent number with biomass alone would take pretty much all of Alabama and Mississippi of the sustainable forest, and I am not sure they are going to volunteer.

Mr. BUTTERFIELD. I have 50 seconds remaining. Does anyone else want to respond to this?

All right. The chair yields back the balance of its time. At this time the chair recognizes Mr. Inslee from the State of Washington.

Mr. INSLEE. I want to ask Mr. Gruenspecht, when you did your assessment, when the agency did the assessment of potential in the South, did it consider hydrokinetic power?

Mr. GRUENSPECHT. No, we did not look at hydrokinetic power. As described in our testimony, we have focused on the main sources of renewable energy that are sort of known characteristics, known costs so we did not look at hydrokinetic power, we didn't look at hot dry rock, geothermal. We focused on the wind, solar, biomass, hydro and sort of I guess more conventional geothermal that is primarily in the West.

Mr. INSLEE. So I am told that Commission staff estimates that the Southeast has the potential to develop about 30,000 megawatts of installed hydrokinetic capacity. Development of potential is estimated to be about 7,000 megawatts for wave energy, 10,000 megawatts for ocean current and 13,000 megawatts for in-river hydrokinetic projects. Now, except for perhaps the in-river hydrokinetic projects, these are pre-commercial application, so you just rule them out because they are not commercially in the water yet? Is that the reason?

Mr. GRUENSPECHT. Well, I don't know that we are ruling them out. It is just that it is hard for us to characterize what they would cost and, you know, again, there is very little basis for us to have it but we are being very clear of what we are including and what we are not including, and so in the analysis we did of the 15 percent standard and the language in the House bill, we found that again the biomass resource in the South, which we could characterize, was what was used. Certainly under a standard, other things potentially could come into play if they were cheaper.

Mr. INSLEE. So you are not taking issue with the report then, I take it?

Mr. GRUENSPECHT. I am not taking issue with it. You know, words like "potential" and "could be developed" without time frames, without, you know, any sense of what it would cost—now, it is important to look at it just like some of these advanced geothermal technologies, other things, but we could not really factor that into our analysis and say, you know, you got 6,238 megawatts of that.

Mr. INSLEE. Well, the reason I ask that is that, you know, if we were going to ask ourselves, should we have a national goal of having 15 percent penetration of the phone market to be cellular phones in 1992, you know, I wonder what this discussion would have been at this hearing. I think probably DOE would come in and say well, commercial phones are not commercially available so we are only going to count bio phones or something. I mean, that is the point I am trying to make. You can respond if you like.

Mr. GRUENSPECHT. I will respond. I am not arguing with you. I just want to point out that I guess some of my fellow panelists have suggested that our analysis is, I don't know what the opposite of conservative is, it is too liberal, and I guess you are suggesting my analysis is too conservative, and we just try to be very clear about what we did and why we did it, and really these are very thorny issues about new technology and will you catalyze new technology. You know, to be fair, I mean, everyone talks about, you know, if we have the mandate it will happen. California had a mandate for zero-emission vehicles in the 1990s that they envisioned as being battery powered, and that turned out to be something of a tougher nut to crack than people thought it was in the

1990s. Now, we are still very interested in battery power, so it is not always the case that if you—yes, if you mandate it, there could be things that aren't anticipated that could come in. I agree.

Mr. INSLEE. But it is an interesting point though. I don't think any State has had an electrical standard that has not failed to meet it, is there?

Mr. GRUENSPECHT. I think on some of them so far—again, they are all phasing in. I think so far that would be a fair characterization. A lot of them have, if you will, I don't want to call them escape clauses but, you know, clauses that if the cost is too high or if something happens and a lot of that may depend on the availability of federal production tax credits and if the federal production tax credits didn't exist then maybe some of those provisions would get triggered. So like always, it is really—you know, it is pretty complicated, as you know.

Mr. INSLEE. I want to make sure I ask Mr. Izzo about the New Jersey experience. My understanding is, New Jersey considered a feed-in tariff at one time and actually had a study about costs and the study came back saying actually a feed-in tariff was the most cost-effective mechanism to really inspire development. I introduced a feed-in tariff and I just wonder if you have any comments about feed-in tariffs, what New Jersey is thinking of them or did you consider what the virtues or vices were?

Mr. IZZO. What we did, probably the best example of a successful feed-in tariff is the one that has been used in Germany. By successful, I define that to mean where lots of solar energy was encouraged. The reason why New Jersey elected to not use a feed-in tariff is, there is a little bit more art than science around selecting what the number needs to be. If you pick the, quote, wrong number, you could get more than you want, and if you pick it too high and if you pick it too low you can get less than you want. So New Jersey instead, despite the success of the feed-in tariff in Germany, has adopted for something that is really more dependent upon a REC market, which is to let the regulatorily created revenue stream float to meet the needs of achieving the standard. So rather than picking a set number, which is a feed-in tariff, we let the number float so as to achieve the RPS. They are comparable methods. We believe the REC approach is a little bit more market based.

Mr. INSLEE. I have one more question. I want to ask Mr. Wise, you have a concern about reaching these targets in a renewable electrical standard. A feed-in tariff works in a situation where you don't pay or you don't get—you are not compelled to buy or obtain any particular percentage but in fact you only are compelled to buy that which is offered to you by an energy producer. Is that a superior model for you, your concerns in the South or an inferior model? What are your thoughts on that?

Mr. WISE. I have no idea. All I know is that if we are talking about credits that we have to buy for what to buy if we can't make the number, that is going to add cost to the ratepayer, and it is clearly not jobs, it is not growth, it is just additional cost for goals that we can't attain.

Mr. INSLEE. You may be familiar with this, but the one virtue of a feed-in tariff is, you wouldn't be required to buy it unless somebody offered to sell it to you. You would be required to buy

it at a specified price, which is usually going to be somewhat over-market at that moment for alternative capacities, limited to a certain amount by statute or regulation. Some of us think that is worthy of consideration. Thank you.

Mr. MARKEY. The gentleman's time is expired. The chair recognizes the gentleman from Utah, Mr. Matheson.

Mr. MATHESON. Thank you, Mr. Chairman, and I would just also associate with what Mr. Inslee just said, that I do think that a feed-in tariff is something we ought to consider in this discussion. It merits being part of this debate. I think we ought to include it.

I have some questions, and I am not sure who should necessarily answer this on the panel, but you guys can decide, about how the issue of an RES fits in with other energy legislation that we are considering. If we have a federal RES and we have an energy efficiency mandate as well and we put in a cap-and-trade law in place with carbon reductions, how do we ensure that these programs are not duplicative, or maybe the more positive way to say it is, how do we make sure that the goals of these different programs are complementary and not in conflict with each other?

Mr. IZZO. I will begin, Congressman. I think the beauty of the RES program as envisioned here is that it really achieves about a 7 percent reduction in CO<sub>2</sub> emissions and most scientists believe we need to achieve an 80 percent reduction. So we are not saying here today that renewables are the only solution. To your point, there are multiple solutions. There is energy efficiency, there is carbon capture and storage, there is new nuclear, there is renewables. To that extent, the importance of a cap-and-trade program to set a price for carbon is essential so that different aspects of that portfolio will come into play more prominently in different regions. So, for example, one may be able to reduce the cost of carbon more effectively in the Southeast through nuclear energy, perhaps more effectively in the Midwest through wind energy, perhaps more effectively in New Jersey through energy efficiency. So cap and trade and a price for carbon seeks to set the price signals for reducing carbon. Each of these components, however, will be essential in bringing about the complete decarbonization of electricity and the complete electrification of transportation.

Mr. MATHESON. But you don't foresee potential conflicts between the different—

Mr. IZZO. I don't. so for example, if the alternative compliance payment is 5 cents a kilowatt-hour, which is \$50 per megawatt-hour, that is the equivalent of \$70 per ton of CO<sub>2</sub> for a coal plant in the Northeast. So if carbon dioxide is trading at \$50 per ton, you will see some other solutions that will offset the need for the REC payment in the RPS.

Mr. MATHESON. Are there other things out there about how to accommodate the regional differences in this country and the ability for some places to pursue renewables more than others beyond the credit idea of paying for credits for renewable energy produced in another part of the country? Are there ways to look at tailoring this such that you get away from the one-size-fits-all approach and encourage different regions to do what is appropriate for that region? Do any of you have thoughts on that?

Mr. BINZ. Congressman Matheson, Ron Binz from Colorado. Like Utah, we are a heavily dependent State on coal right now, and we are looking to move away from that and we are hoping to move to clean coal technologies in our region. But we see renewables and I hope every State sees renewables as one essential piece of this total solution. We have been talking about a ramp-up in Congressman Markey's bill, a ramp-up which I think will allow these industries to develop in States. I think it will be very transformative to put that requirement in. I will be very surprised if Georgia or any other southeastern State pays the penalty, if you will, for non-compliance with the 5-cent credit we have been talking about. I think they will do it much more effectively with either resources that they are generating themselves or purchasing.

Now, I want to also speak to an issue which I know a lot of members are interested in is, I think we should be looking at strengthening the transmission side so we can move some of these electrons around. The virtual purchase of renewable energy by buying credits from out of region places works up to a point. At some point you actually do need to move the power when you don't have sinks in these regions with the excess capacity. So I guess what I am saying is, I think the gradual ramping up of the standard is what is going to answer the question you just raised. I think solutions get discovered along the way without an immediate problem being presented to these States, and purchases of RECs will eventually be phased out. That is in fact how Colorado met its renewable energy requirement its first year. We bought a lot of solar RECs from other States. We then said we don't want to be doing that, we want to develop our own industry in the State, and that is what is happening.

Mr. MATHESON. Thank you, Mr. Chairman. I will yield back.

Mr. MARKEY. I thank the gentleman.

The chair will recognize himself, and we might have time for more questions if the member are interested. Oh, Mr. Scalise, have you been recognized yet for a round of questions?

Mr. SCALISE. No.

Mr. MARKEY. Then the chair recognizes the gentleman from Louisiana.

Mr. SCALISE. I thank the chairman.

I do have a couple of questions for Mr. Izzo. In New Jersey, I am not sure of the percentage but I know New Jersey generates a significant amount of power from nuclear, and maybe you can share with me what that is.

Mr. IZZO. Our company alone generates 50 percent of our electricity from nuclear. I think statewide is more like 40 percent.

Mr. SCALISE. Do you believe that nuclear power should be included in the renewable definition?

Mr. IZZO. No, I don't. I think it is an important part of global climate change solutions but I don't think it is a renewable source of energy. It is a carbon-free source of energy.

Mr. SCALISE. Exactly. But why wouldn't you think that encouraging our country to do what many other countries, especially in Europe and beyond, are going to as a carbon-free source that is very reliable, not intermittent?

Mr. IZZO. I am an advocate of encouraging it by setting a price for carbon and a cap-and-trade system. Nuclear is quite competitive if one allows for the externalities that are not being captured in today's energy market to be captured. That is quite different than the nascent technologies that we are trying to make sure become an integral part of that solution mix through an RES. I mean, at the end of the day uranium 238 is not renewable. You use it up. It is carbon-free but it is not renewable.

Mr. SCALISE. Mr. Wise, I would like to get your take on it as well as what some of these compliance fees may ultimately yield in consumer prices.

Mr. WISE. Say again?

Mr. SCALISE. Well, first on Mr. Izzo's comments about nuclear as not being considered renewable.

Mr. WISE. We think including nuclear in this bill would be vital. We are currently considering two new reactors and feel like that if carbon emissions are one of the issues that we are looking for and the goal of renewables, then we think those are one of the mainstays of what we are trying to do in Georgia. Again, it goes back to the one size fits all. Clearly, we are constrained by lack of resources in this marketplace. As the model moves, as the technologies develop, as we have heard from this panel today, we think that we will be able to ultimately benefit from them if it is in solar if we can do more with the humidity and the cloudy days that we have, but ultimately it is just too fast a pace for somebody in a region that doesn't have the opportunities that maybe they do in other States.

Mr. SCALISE. If standards are set up in a way that don't encompass some of these other things I guess where we have a disagreement but where many have proven an ability to produce renewable sources that don't count in the definition, ultimately what would that mean in terms of prices for consumers?

Mr. WISE. Well, it would be significant, and every time a new proposal comes out we are looking at the impact of what it would be on the consumers, the average consumer in our State, and we have heard the same numbers that I am sure you have, anywhere from 5 to 25 percent is what it could be.

Mr. SCALISE. Rate increases?

Mr. WISE. Rate increases on top of already a volatile marketplace.

Mr. SCALISE. And obviously we can all agree that it is important to encourage and expand renewable sources of energy. That definition is probably going to be one of the more critical debates because it leaves out some things that truly are renewable but maybe aren't included in the definition.

Mr. WISE. Waste-to-energy is a classic example, and we are seeing the development—

Mr. SCALISE. And clean coal.

Mr. WISE. Clean coal, the sequestration. Biomass is going to be something that is a part of it. I am not sure that we are still sustainable to do—

Mr. SCALISE. And I do want to ask you about that because I know it has come up, and before my time runs out, there has been some talk that in the southeast part of the country where maybe

wind and solar isn't as prevalent as a reliable renewable, that some have said that biomass could make up that difference. Others disagree. What is your take on that?

Mr. WISE. Again, it is not sustainable to make up the difference in our State with just biomass. Biomass would have to be a piece of it. It would be a significant piece but we couldn't meet the 20 percent. We couldn't make 10 percent with biomass in the southern states. We have a lot of trees but we don't have that many trees.

Mr. SCALISE. And obviously then we have the concern about what that means to consumers in increased rates. Some of these things are thrown around without necessarily factoring in the consequences. I would be curious to see if there would be tracks on what consumers would pay because I think most consumers would say yes, I want to support expansion of renewable sources of energy, and many people have already started to conserve. Of course, they won't get credit for that. That is not something they are going to get credit for but on the backside they could get penalized if while they are conserving, while their State is using renewable sources of energy that aren't included in the definition, they are going to be paying higher rates and they are going to say wait a minute, that is not what I said when I answered that poll question about whether I support renewables. It is a whole different story when my renewable isn't included and now I am paying 25 percent more on my utility bill.

Mr. WISE. Some of the users, the potential users of pulp and paper in our State are already complaining about the move toward biomass, about the impact that I will have on their customers, on their industry, and have actually been interveners in some of the cases before our Commission raising the issue of what it will do to prices for them.

Mr. SCALISE. And we have already heard some testimony from industry who have talked about—one person earlier this week in testimony said they have laid off 100,000 people. Some of those have been jobs shipped overseas because of the concerns of some of these policies, and there is a big cost on the other side and that is why it is important that we encourage this but we watch the consequences too, so I will yield back. Thank you.

Mr. MARKEY. The gentleman's time is expired. The other gentleman from Louisiana, Mr. Melancon, is recognized.

Mr. MELANCON. Thank you, Mr. Chairman. I apologize. Actually I had meetings in my office concerning just what we are talking about today in between votes.

One of the questions I guess I have got and to no one specifically but whoever feels they are best to answer this, is there a feeling—and I am looking at this. I don't see in the proposal nuclear anywhere. Would that not be a good alternative?

Mr. IZZO. Congressman, our company is as we speak working on an early site for a new nuclear power plant. With luck, it will be ready to produce carbon-free electricity in 12 years. Our company is working on an offshore wind farm. With luck, it will produce 350 megawatts of carbon-free electricity in 4 years. We are developing compressed air energy storage systems to make more economic onshore wind. With luck, it will produce carbon-free electricity in 2 years. We are also in the process of developing solar energy that

will be deployed within the next few months, and hopefully in the 30 seconds it took me to say this, we have installed yet another compact fluorescent light bulb and a few more programmable thermostats to bring about energy efficiency this minute. We need to do all of it. Nuclear is important but it is not a renewable energy supply and it doesn't need to impinge upon the need for solar, wind, biomass and the like.

Mr. MELANCON. On the nuclear, it is not renewable in a sense but it can be reprocessed. Cannot that material be reused?

Mr. IZZO. You can get more of the energy content out of what we today call the waste. I guess you can call that reusing but you can be more efficient with the use of the fuel. At the end of the day, the fuel is consumed.

Mr. MELANCON. Mr. Wise?

Mr. WISE. Yes, sir, I do agree that nuclear power should be considered in these standards.

Mr. MELANCON. Do you think this is the area on the complementary or should it come under some other section of the bill?

Mr. WISE. I believe if you are going to have a renewable energy standard, that new nukes should be included.

Mr. MELANCON. I guess the question I have here is, when you look at the sources of fuel, if nuclear is not part of the equation, if everything available is not part of the equation with proper credits and encouragement, do we end up just going to the cheapest fuel and we are back to coal? So if nuclear is not in here, is there anybody that would suggest that we do nuclear in this section to give options and alternatives to the power companies?

Mr. WISE. I would clearly hope so.

Mr. BINZ. Congressman, Ron Binz from Colorado. I would oppose the use of nuclear as a fuel that would satisfy the renewable energy requirement because that effectively will gut the provision. One nuclear plant will probably wipe out a State's renewable energy requirement. You won't get the impact that this bill is intended to effect, namely to bring some new technologies along. I completely agree that nuclear ought to be considered as one of the primary ways of fighting global warming and climate change but I don't think you do it through this bill. Nuclear power does today receive its share of research subsidies and insurance subsidies and all sorts of other things as do most of the rest of the parts of this industry but I think that it would be a mistake to essentially qualify it as a renewable resource, and that is just semantics. Whatever it is, it is, but the point is that you don't want to, I think, take away the impact that this legislation is attempting to have for the wind, the solar, the biomass, the geothermal and all the other resources that this is intended to boost.

Mr. MELANCON. Who can tell me what the life span of the material used in the generating facilities, the nuclear facilities? How long a lifespan is one cylinder, or how do you measure it?

Mr. IZZO. Most power plants are on an 18-month refueling cycle where they replace one-third of their fuel core.

Mr. MELANCON. And how much material is that?

Mr. IZZO. I don't know the answer.

Mr. MELANCON. I am still trying to figure out what the megawatts consumed by—but anyway, I am out of time, but I appreciate it. Thank you, Mr. Chairman.

Mr. MARKEY. I thank the gentleman.

The chair recognizes himself one more time. There were 8,000 new megawatts of wind constructed in the United States in 2008. If we just take Mr. Izzo's projection for the nuclear power plant which he is building for his company, he is using a 12-year timeline. If you just multiply 12 times 8,000 megawatts, you are near 100,000 megawatts. That is if we stay at the same pace. Of course, if we have a national renewable electricity standard, wind will wind up at 150,000 or 200,000 megawatts within 12 years before the first nuclear power plant comes on line. So we just have to be realistic here. No one is saying nuclear is not going to be part of the mix but because of the timeline and the cost of nuclear and the fact that we have a history over the last 34 years in terms of its financing it, it has great difficulty in receiving financing in the private sector, as opposed to France and China and Japan where the government pays for it. Here we have to get private investors and they have been shying away from it. So just realistically in 2020, we might have 1,000 or 2,000 new megawatts of nuclear but we will have somewhere between 150,000 and 200,000 in megawatts of wind by then at the pace at which it is going right now. That is just the reality of it. But no one is saying nuclear is going to be out but that is just the way it will turn out.

Let me ask Mr. Gruenspecht, Mr. Melancon raised coal. In your new Annual Energy Outlook 2009, it shows a fairly substantial reduction in projected coal-fired generation. Can you explain the magnitude of that decrease in your projections?

Mr. GRUENSPECHT. It is not really a reduction in coal-fired generation. It is a reduction in new builds of new coal-fired plants, and we try to reflect likely behavior under current laws and policies so we are not making assumptions about what you would do but we do rely on recent behavior as a key indicator, and although existing plants continue to be operated based on economic dispatch and produce about half the Nation's power as people have said, concerns about greenhouse gas emissions do appear to be having an impact on investment decisions for new plants, and so because that impact is being felt, we are reflecting it.

Mr. MARKEY. And so can you give me an idea of how many fewer—can you quantify what you believe the reduction looks like?

Mr. GRUENSPECHT. There is certainly, what, about 10 to 15 gigawatts, I think, under construction now.

Mr. MARKEY. Ten to 15,000 megawatts?

Mr. GRUENSPECHT. Ten to 15,000 megawatts, excuse me, under construction now, and we see after that not much being built probably until about 2025 and then more. I can get you the specific numbers for the record.

Mr. MARKEY. That is pretty telling, that just looking at the marketplace today that you see only 10,000 to 15,000 in the pipeline whereas as we can see with wind that that is the projection for just the next 3 or 4 years at current pace absent the extra spur that a national renewable electricity standard would create to increase construction.

Mr. GRUENSPECHT. I mean, another thing to keep in mind, of course, is that difference, that a coal plant or nuclear plant runs at a much higher utilization.

Mr. MARKEY. No, I understand that.

Mr. GRUENSPECHT. I know you do, sir.

Mr. MARKEY. But just the scale of construction.

Mr. GRUENSPECHT. Absolutely.

Mr. MARKEY. And Mr. Lowe, you talked about all the jobs that would be created in the near term if we move towards this renewable side, and if you could just talk a little bit, Mr. Gruenspecht, about the impact that a national renewable electricity standard could have in substantially alleviating the demand for natural gas in the power sector. How significant an impact on natural gas prices could a strong renewable standard have?

Mr. GRUENSPECHT. Well, we do in our past analyses. We haven't yet done the one that you have just sent to us, but in the past it is the case that beyond things like biomass cofiring, which clearly back out coal, you do tend to back out the most expensive things that you would otherwise be using, and in many regions of the country that is gas, so you would burn less gas and that can have an effect on the price of gas, which affects the price of gas used both for electric generation and the price of gas used for other purposes like home heating. So we got, as I described in the testimony, in the previous analysis modest increases in what we looked at in expenditures for electricity by consumers for the reasons that have been discussed but to some extent offset by some reduction in the cost of gas.

Mr. MARKEY. I know Mr. Wise has to go. I would like to let him have the last word here. Mr. Gruenspecht, if you look at 2008 where 50 percent of all new electrical generation installed was natural gas, 42 percent was wind, 6 percent was coal and the remaining 2 percent was low-head hydro, solar, all the rest, I am just looking for you to just make a comment about that because natural gas is half the CO<sub>2</sub> emitted as coal. That is probably why we are seeing business decisions being made that are shying away from coal. But that seems like a good partnership natural gas and wind going forward with the other renewables playing an increasing role as the years go by.

Mr. GRUENSPECHT. Again, I don't want to take a policy position.

Mr. MARKEY. You are an analyst.

Mr. GRUENSPECHT. I am an analyst. A lot of gas capacity was built in the first 5 years of this decade, tremendous amounts, in part because many people had thought that gas prices, you know, would stay low for a long period of time. We are still working our way in some sense through that capacity but in the present environment where there is reluctance to build coal as we discussed, what is getting built is mostly the number of coal plants that I mentioned plus some combination of a lot of wind and some gas where additional capacity is needed. Gas is sort of kicking the can down the road in terms of making a decision because most of the cost of gas-fired generation is in the fuel other than the plant, and if you don't know what is going to be happening, you don't want to put big money on your plant. You want to just need the need as cheaply as possible, be as flexible as possible.

Mr. MARKEY. What I would like to do, if the two gentlemen from Louisiana wouldn't mind, is give each witness down here 1 minute to summarize what they want us to know, and to let Mr. Wise, because he has to run for a flight, give you kind of an extended one because you are a little bit outnumbered here. Please give us the 1 minute you want us to remember on this committee as we move forward on a renewable electricity standard.

Mr. WISE. That is very fair, Mr. Chairman. I appreciate it very much. I think first and foremost that everybody in this room, your committee and this panel have all agreed that renewables and the future of energy in this country will be and have a significant part of renewables. We just ask for an ultimate understanding that one size fits all is not beneficial to my State, the southern States and that ultimately that all aspects of clean emissions need to be considered. That would include nuclear, it would include clean coal or sequestration, waste-to-energy and enhanced hydro, and I think that would be my message.

Mr. MARKEY. Thank you, Mr. Wise, very much.

Mr. Gruenspecht.

Mr. GRUENSPECHT. Mine is easy. We are here for you and the members. These are thorny issues. The devil and the angels are in the details, as I said. There are lots of different ways to do things. Those are your decisions, not ours, but we will be glad to provide both data and analytical support.

Mr. MARKEY. Thank you, Mr. Gruenspecht, very much, and thank you for your good work.

Mr. Lowe.

Mr. LOWE. What I would like to leave with you is the fact that renewable energy has the ability right now to create significant green collar jobs in the United States. From a perspective of wind, that is about 500,000 jobs by 2030, on one projection. By 2016, there could be approximately 230,000 solar jobs. And we also have the ability, as you indicated in your statement, about 8,000 megawatts of wind going in in each year to immediately reduce carbon emissions for generation going in today.

Mr. MARKEY. Thank you, Mr. Lowe.

Mr. Binz.

Mr. BINZ. Thank you, Chairman Markey. A couple of points. One is, I want to emphasize the transformative nature that a renewable energy requirement had in my State and I believe that a similar salutary effect would be had if it were adopted in other States via national legislation. We have got more jobs dedicated to this than we would have had if we had gone down the route of traditional fossil generation. I would also like to stress that the cost of renewables will come down as their proliferation in the market increases, and that is something which I think is a very important part of your legislation. Finally, I think we do a disservice to customers if we suggest that renewables are going to raise their cost as if other compliance measures won't. We have got a very substantial challenge with global warming to decarbonize the electric sector. I look at renewables are a very hopeful component but we should not be suggesting that 15 percent if somebody uses that number increase that that might drive is on today's base because we are looking at expensive new plants of every stripe that are going to be necessary.

Mr. MARKEY. Thank you, Mr. Binz.

Mr. Izzo.

Mr. IZZO. Yes, Mr. Chairman. We face some fairly daunting challenges and opportunities, climate change, national energy security and sustainable economic development. We can lay the foundation for that with a carbon price through a cap-and-trade system. We need a portfolio approach to reducing carbon. Renewable energy is a critical component of that portfolio. A national approach is needed. It is only through a national approach that we can make the most economically efficient decisions. New Jersey joyfully buys its citrus fruits from the Southeast, its grains from the Midwest and we joyfully export our pharmaceuticals and telecommunication products to those places. The same should be had for energy policy.

Mr. MARKEY. We thank each of you and Mr. Wise for your testimony. This is a very important issue right at the heart of the revolution which is taking place in Germany, in China. If we don't move, they are moving. We will be importing their technologies. That is the bottom line. It is an engine of job creation which General Electric is now taking the lead in our country and in the world and I think we just have to keep pace and try to exceed the rest of the world in this subject. We should try to be number one looking over our shoulders are number two and three and four in the world because this is a job creation engine, and if we don't, we for sure will be importing 20 and 30 years from now having lost an opportunity to create a real manufacturing base in our country. So this is going to be a central part of the debate of climate change over the next several months, and we thank you for your participation. It has been very helpful to the committee. This hearing is adjourned.

[Whereupon, at 1:10 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

**Opening Statement****Rep. G. K. Butterfield****February 26, 2009**

On August 20, 2007, North Carolina Governor Mike Easley signed the Renewable Energy and Energy Efficiency Portfolio Standard into law. The mandate was the first of its kind in the southeast region, and it requires a renewable standard 12.5% by 2021. The standard permits efficiency to meet up to 40% of that mandate. This historic step will reduce the state's carbon footprint by 13 million metric tons by 2018, and will drive innovation and adaptation of a number of new technologies, feedstocks and efficiency gains.

I mention this law to give credit to my fellow North Carolinians but also to highlight the bill's emphasis on energy efficiency and its appreciation of regional disparities concerning access to renewable energy. While I am supportive of the Chairman's efforts to craft and pass unprecedented legislation for renewable energy, and let me be clear in my support, I would be remiss if I did not ask my Chairman to work with me as we proceed to ensure that this legislation is passed with appropriate sensitivity to the realities facing the Southeast.

As he well knows, the Southeast is currently at a competitive disadvantage in terms of availability of cost-effective renewable resources. Access to

biomass will expand with the deployment of new technology, but currently, the sources are not online. I believe it is time that we send price signals to innovators to ramp-up development of biomass, offshore wind and a number of other resources. But the overall goal remains the reduction of greenhouse gas emissions, and if we can bring that change about with a diverse approach that includes renewables, efficiency and even nuclear, we will foster innovation and maintain regional equity.

Congressman Gene Green  
Energy and Environment Subcommittee Hearing  
“Renewable Energy: Complementary Policies for Climate Legislation”  
February 26, 2008

Thank you Mr. Chairman for holding this critical hearing today on complementary renewable energy policies for climate legislation.

Today’s hearing will focus primarily on a federal renewable portfolio standard.

Coming from Texas, which is the nation’s leader in renewable energy production and a pioneer in developing its own state portfolio standard, I support efforts to promote renewable energy production that meets the unique circumstances and resources of each state.

Texas is the number one producer of wind energy within the U.S. and wind production has quadrupled since the establishment of our state RPS.

Texas is also strategically addressing its renewable energy transmission capacity by designating competitive renewable energy zones, or CREZ, which will help move capacity from rural to urban areas in the state.

Unfortunately, other states are not often as open to transmission corridors and Congress must address the nationwide ability to move energy across the states.

If Congress is to move forward with a national renewable portfolio standard, we must be mindful of our long-term energy goals -- whether they be to actually reduce carbon emissions or to simply promote alternative energy sources - - and whether these benefits outweigh any negative impact on the affordable and reliable supply of energy to Americans.

I am mindful of the impacts on consumer energy prices because I represent an extremely low-income District whose family budgets are price-sensitive to rising energy costs.

A federal RPS must be taken into context with potential climate change legislation which will also have its own unique impacts on energy costs and supplies.

If Congress moves forward with a nationwide RPS, I will carefully follow its targets and timetables, transmission capacity issues, state renewable energy capacity, and cost of compliance for utilities and consumers.

I also believe Congress should provide a long-term extension of the production tax credit so we can provide investment certainty for renewable projects across the country.

I look forward to the hearing and testimony.

Thank you.

**Opening Statement -- Congressman Mike Ross  
Energy and Environment Subcommittee Hearing  
“Renewable Energy: Complementary Policies for Climate Legislation”**

Thank you Chairman Markey for organizing today’s hearing. While federal policies to increase the use of renewable energy are a focal point of this Subcommittee, I am deeply concerned that the more traditional renewable resources – wind, solar, geothermal, and biomass – do not exist in places like Arkansas in sufficient amounts to satisfy a federal mandate, especially an aggressive one.

For example, in my congressional district, approximately 191,000 consumers receive their electricity from 8 rural electric cooperatives (co-ops). Moreover, co-ops provide electricity in thinly-populated areas in rural Arkansas where there are approximately 6.5 consumers per mile. As a result, any increase in electric rates due to the implementation of a Renewable Electricity Standard (RES) will fall disproportionately on consumers in my district.

However, I want to acknowledge that renewable electricity is being used throughout the country and co-ops are significant participants in this activity. The Arkansas Electric Co-op Corporation is a member of the newly-established National Renewables Cooperative Organization (NRCO). This cooperative will facilitate the use of renewable electricity by many electric cooperatives through identifying potential renewable energy projects; performing economic evaluations and risk assessments; and developing plans resulting in agreements to purchase electricity from these projects.

Also, through financing from the Rural Utility Service (RUS) and the Clean Renewable Energy Bonds (CREBs) program, co-ops are developing more renewable electricity projects. The American Recovery and Reinvestment Act of 2009 (ARRA) funds several additional programs that will enhance efforts in renewable electricity production and energy efficiency.

Unfortunately, current federal legislative proposals do not recognize large-scale hydroelectricity as a renewable electricity resource. However, in my state, the Southwest Power Administration (SWPA) provides clean, renewable power – and approximately 4 percent of the electricity that co-ops sell to consumers. Co-ops in Arkansas also use energy efficiency and demand response strategies to reduce the release of greenhouse gases. In fact, the Federal Energy Regulatory Commission (FERC) recognized co-ops as industry leaders in using advanced meters to improve load management and overall efficiency.

Arkansas has yet to establish a state RES. Some believe biomass could be used to meet such a requirement. In his written testimony, however, Georgia Public Service Commissioner Stan Wise disagrees with such an assertion. According to Commissioner Wise, there will be increasing demand from the pulp and paper industry and the cellulosic ethanol industry for this renewable resource. He foresees that demand will be high enough to make it problematic to rely on biomass as the region's renewable electricity silver bullet.

I believe Commissioner Wise is correct. Without enough biomass supply to satisfy the requirements of a federal RES, my state would be left dependent on other states for the means of compliance with an RES mandate. Utility companies and Co-ops would be required to purchase credits from renewable energy rich states and regions, thereby transferring wealth from Arkansas. Alternatively, they would be required to make compliance payments to the federal government, ranging from 3 cents per kilowatt hour (kWh) to 5 cents per kWh. At five cents, this penalty would result in approximately a 50 percent rate increase for co-op consumers. Under both scenarios, electric rates would increase in Arkansas, and this is an untenable proposition for me.

To mitigate the potential steep increase in electric rates associated with a federal RES, legislative proposals would have to be altered in meaningful ways. Some of the changes should include: establishing an exemption for all electric utilities with retail sales of 4 million megawatt hours or less (which corresponds with the Small Business Administration's definition of a small electric utility); incorporating energy efficiency and demand response activities as eligible renewable electricity resources; and rethinking compliance payments.

However, even if these and other changes are implemented, I continue to have serious reservations regarding a federal RES. With a lack of sufficient renewable electricity resources in my state, aggressive RES mandates will add create a burden of much higher electricity bills for Arkansas consumers and businesses.



**Department of Energy**  
Washington, DC 20585

June 22, 2009

The Honorable Henry A. Waxman  
Chairman  
Committee on Energy and Commerce  
U.S. House of Representatives  
Washington, DC 20515

Dear Mr. Chairman:

On February 26, 2009, Howard Gruenspecht, Acting Administrator, Energy Information Administration, testified regarding "Renewable Energy: Complementary Policies for Climate Legislation."

Enclosed are the answers to 11 questions that were submitted by Representatives Green and Baldwin to complete the hearing record.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen, at (202) 586-2031.

Sincerely,

A handwritten signature in cursive script that reads "Betty Nolan".

Betty Nolan  
Senior Advisor  
Congressional and Intergovernmental  
Affairs

Enclosures

cc: The Honorable Edward J. Markey, Chairman  
Subcommittee on Energy and Environment



Printed with soy ink on recycled paper

**QUESTIONS FROM REPRESENTATIVE GENE GREEN**

- Q1. As you know, Texas is the #1 producer of wind energy in the nation. Wind and solar power is also intermittent, which requires additional backup capacity -- often gas generation capacity --- in order to meet demand. In his testimony, Mr. Wise states that if the eastern U.S. alone were to meet 20% of its energy requirements with wind, 67,200 MW of natural gas capacity would be needed to provide back up when the wind is not blowing.
- Q1a. In your estimate, how much natural gas would be required to provide back-up for intermittent energy sources, such as wind and solar, that would be developed under a nationwide RPS of 25% by 2025?
- A1a. EIA's recently completed analysis of the Renewable Energy Standard in the American Clean Energy and Security Act (ACESA) discussion draft dated March 31, 2009, indicates that less natural gas capacity would be built and less natural gas would be used for generation with this proposal than in the *Annual Energy Outlook 2009* updated reference case. This proposal resulted in a mix of intermittent (primarily wind) and dispatchable (primarily biomass) renewable resources, so any displacement projected of other capacity and generation types cannot be solely attributed to one specific renewable resource.
- Q1b. In EIA's June 2007 RPS analysis, EIA found that -- nationwide -- natural gas expenditures were on average reduced by 0.1 percent. However, for regions that would rely extensively on intermittent renewable energy sources to meet any renewable production targets, and would therefore require extensive backup natural gas fired generating capacity, would there regions experience higher or lower natural gas prices?
- A1b. In the June 2007 Renewable Electricity Standard (RES) analysis, EIA found that in the two regions with the most new wind capacity, natural gas consumption for electricity generally (but not universally) decreased compared to the reference case, as the increase in wind generation tended to displace fossil generation that otherwise would have been used to meet energy demands. The June 2007 study indicates no notable differences in natural gas price impacts among the regions modeled. The results of EIA's recently released analysis of the ACESA RES provision are consistent with this previous result. Because

natural gas is a storable commodity that is widely traded and transported around the country, long-term differences in price among regions of the country largely reflect interregional gas transportation constraints or differences in gas transportation costs.

- Q1c. Was back-up capacity taken into account when EIA configured the cost of electricity from intermittent sources of energy in its estimates?
- A1c. When developing its long-term energy market projections, such as were used for the June 2007 RES study or the more recent ACESA RES analysis, EIA used a relatively detailed accounting of the impact of intermittent generators on grid operations and planning, and the resulting costs to the system in ensuring that sufficient reliable capacity is built to meet regional needs. In general, new capacity can be built to serve additional growth in baseload energy requirements and/or to meet growth in peak capacity/reliability requirements. With conventional generators, these two needs can generally be met with the same generating units, although the distinction between energy needs and capacity needs is important in determining what kind of conventional capacity to build (such as baseload capacity from coal or peaking capacity from natural gas turbines). Because of their inherent intermittency, wind plants primarily serve energy needs, and do not provide much contribution to capacity needs. In regions with sufficient capacity, but in need of renewable energy to meet an RES requirement, it may not be necessary to add any additional back-up capacity to meet reliability needs. In regions requiring both renewable energy (to meet the RES) and capacity (to serve reliability), both wind and low-cost dispatchable capacity, such as combustion turbines, may be added at the same time; however, the combustion turbines are primarily added for capacity, and may not produce much energy—just as the wind is added for energy, and may not contribute much to capacity requirements.

- Q2. California's Public Utility Commission recently analyzed a proposal for their state to generate a 33% RPS by 2020. California's PUC determined that "such a target may require a state investment of about \$60 billion in generation and transmission" over a 10 year period from 2010 to 2020. While this target is higher than current proposals in Congress, that's \$60 billion in compliance costs for one state alone.
- Q2a. What are the estimated generation and transmission costs to build the infrastructure necessary to meet a national RPS target of 25%?
- A2a. EIA's National Energy Modeling System does account for the costs of generation and transmission equipment needed to meet the demand for electricity with increased renewable generation. However, it is possible that costs could be higher than average if a substantial expansion of the transmission system is required.
- Q2b. Does EIA include these transmission cost [sic] when estimating the impact on consumer energy prices? If not, why not, and what would these increased cost estimates be?
- A2b. EIA projections account for the cost to build transmission to support incremental capacity additions, including the additional transmission costs associated with building wind capacity in remote areas that would require above-average transmission investment. Within our projections, these costs are incorporated into consumer electricity prices in a manner determined by the dominant regulatory/market structure of each of the 13 electricity market regions represented. In regions with cost-of-service regulation, transmission investments are incorporated into the capital expenditures portion of the rate-base, and are apportioned to customer rates. In regions with wholesale power markets, the cost is allocated to the plant that incurs the expense, which must recover this expense along with all other fixed costs through the difference between their costs and the market-clearing price for electricity. In such a region, these costs are only passed on to consumers to the extent that the producer that incurs the cost also sets the marginal price of electricity.
- Q2c: With significant legal and siting challenges, which dramatically increase the cost for inter- and intra-state transmission capacity, do you think it is prudent for Congress to consider

Federal backstop authority, similar to the National Electric Transmission Corridors, in order to quickly build capacity to move the renewable energy called for under an RPS?

A2c. [This question was referred to the Office of Electricity Delivery and Energy Reliability for appropriate response]. The Department believes that without Federal backstop siting authority for transmission facilities, it will be very difficult to build the new transmission capacity needed to reduce carbon emissions and increase our reliance on renewable resources for generation.

Q3. When EIA produced the .4% estimate in increased electricity costs for consumers EIA qualified its findings by stating that “ the RPS proposal was modeled on a standalone basis, so its possible interactions with other policy changes...or other bills [was] not considered.” I don’t think anyone here is assuming that the RPS is intended to be a stand alone policy. We are debating the RPS today as a complementary policy for climate change.

Q3a. If we were to combine the impacts of both an RPS and potential climate legislation, how much would electricity prices be expected to rise under this scenario?

A3a. In EIA’s recently released analysis of the RES portion of the March 31 ACESA discussion draft, we did not consider the other provisions of the bill establishing a comprehensive climate change policy. Because EIA has not performed work in this area, we cannot provide any comparable estimates. However, in our previous climate policy analyses, we have generally found that a cap-and-trade policy proposal would likely lead to significant growth in renewable energy, which becomes more attractive when the costs of using fossil fuels go up. All else equal, a cap-and-trade program therefore makes a given RES target easier to achieve and reduces its incremental cost. An Energy Efficiency Resource Standard, which reduces or eliminates load growth, and therefore the need for additional capacity, makes a given RES target more likely to require that new eligible renewables replace generation from existing capacity rather than from other types of new capacity.

The cost penalty associated with backing out existing capacity is generally larger than that associated with backing out other types of new capacity.

- Q3b. It can be assumed that it [the impact of a combined RES and climate change policy on electricity prices] will be a lot more than a 0.4% increase, correct?
- A3b. As noted above, EIA has not yet published an analysis of a combined RES and climate change policy. Because EIA has no prior work in this area, we can not estimate the likely range of impacts on electricity prices. Past EIA studies of either RES policy or climate change policy indicate that factors such as stringency and design of the policy and baseline market conditions can affect how the policy affects electricity prices.
- Q4. In EIA's June 2007 study of a 15% RPS, EIA found that consumers spent on average about .4% more on electricity than in the reference case. However, in your testimony you mention that "impacts on specific sellers may vary significantly." In addition, a subsequent EIA analysis of a RPS proposal (25% RPS by 2025) found that an RPS "could...result in a lower electricity prices in some areas of the United States," particularly areas with "considerable renewable resources."
- Q4. While EIA's cost analysis provides a nationwide average, do you have figures as to the rise in energy costs for specific regions in the U.S. which do not have considerable renewable resources and may not be able to meet an RPS mandate?
- A4. The following table indicates the percent change in electricity price, compared to the reference case, for electricity market regions from our most recent analysis of the Renewable Electricity Standard proposed by Chairmen Waxman and Markey. Note that a positive number indicates an increase in price relative to the reference case. This can be compared against the regional compliance estimates produced by EIA for this study and available at [http://www.eia.doe.gov/oiaf/servicrpt/acesa/ne/resfec\\_nec.html](http://www.eia.doe.gov/oiaf/servicrpt/acesa/ne/resfec_nec.html) (which also has a map of the regions). The case shown assumes that no states will claim the energy efficiency credits that may be allowed under the proposal to offset up to one fifth of the required renewable generation. Regions that tend to over-comply with the RES, i.e., they export credits, tend also to have a lower electricity prices than in the reference case, and

vice versa. However, these correlations are not perfect. For example, California is projected to be a net exporter of credits through the entire projection period, but has a slight increase in electricity prices in the years. ECAR, on the other hand, is a net importer of renewable credits throughout the entire projection period, and in several years has a slightly reduced electricity price.

<i>Region</i>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
National	-0.04%	-0.14%	-0.02%	2.92%	0.79%
1-ECAR	-0.03%	-0.01%	0.24%	4.99%	2.65%
2-ERCOT	-0.17%	-2.25%	-2.36%	-1.48%	-4.08%
3-MAAC	-0.40%	2.34%	1.33%	4.83%	2.24%
4-MAIN	0.00%	-0.49%	0.36%	0.75%	-3.17%
5-MAPP	-0.95%	0.66%	-0.56%	-10.18%	-10.32%
6-NY	-0.13%	-0.39%	1.24%	4.85%	2.55%
7-NE	-0.10%	-0.53%	-0.41%	3.79%	1.58%
8-FL	0.03%	0.39%	-0.57%	4.09%	2.90%
9-SERC	0.05%	-0.31%	0.80%	5.63%	3.50%
10-SPP	0.10%	-0.97%	-0.53%	2.24%	-0.10%
11-NWP	-0.04%	-0.99%	-2.45%	-0.26%	-1.82%
12-RA	0.01%	-0.26%	0.52%	6.16%	3.69%
13-CA	0.03%	0.59%	-0.69%	0.26%	-0.46%

**QUESTIONS FROM REPRESENTATIVE TAMMY BALDWIN**

Q1: One of the concerns about an increase in renewable energy is how the energy will move from points of generation to major demand centers. In fact, as this issue relates to biofuels, we included a study in EISA to examine the adequacy of railroad transportation for domestically produced renewable fuel.

I also have concerns about the adequacy of our electricity grid for moving renewable energy, and support the development of a robust transmission grid, but have concerns that as renewable resources from the Great Plains are used to meet demands in the Midwest and Northeast, the costs and liabilities related to this substantial new transmission growth will be born by certain states disproportionately. How can we ensure that the costs of this new national transmission system are allocated relative to the benefits received?

A1: [This question was referred to the Office of Electricity Delivery and Energy Reliability for appropriate response]. The Department believes that building the new transmission networks we need would benefit us all by enhancing reliability, enabling lower carbon emissions, and reducing our dependence on petroleum-based fuels in the transportation sector. Because cost allocation for transmission facilities is a responsibility of the Federal Energy Regulatory Commission (FERC), the Department defers discussion on this matter to FERC.

Q2: Another concern in building renewable energy transmission is that we build what we need, when we need it. If the Federal government is given greater authority in expanding transmission infrastructure, how do we ensure that local, state, regional, and Federal collaboration occurs so we have the right recipe?

A2: [This question was referred to the Office of Electricity Delivery and Energy Reliability for appropriate response]. The Department believes that it is essential to plan transmission systems through transparent and collaborative processes involving Federal, state, and local officials, electric reliability organizations, regional transmission organizations and independent systems operators, the electricity industry, and other stakeholder groups. If Federal legislation is enacted to give greater authority to Federal

agencies regarding transmission, that legislation should also establish requirements pertaining to comprehensive and long-term transmission planning.



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April 20, 2009

The Honorable Henry A. Waxman  
House of Representatives  
Committee on Energy and Commerce  
Chairman  
2125 Rayburn House Office Building  
Washington, DC 20515-6115

Dear Representative Waxman,

Thank you for the opportunity to answer the committee's questions regarding my testimony of February 26, 2009, at the hearing entitled "Renewable Energy: Complementary Policies for Climate Legislation".

Pursuant to the requests of the Committee members, I have included the questions and answers for the record. If there are any additional questions of the committee, please contact me directly at 404-657-4574 or [stanwise@psc.state.ga.us](mailto:stanwise@psc.state.ga.us).

Sincerely,

A handwritten signature in cursive script, appearing to read "Stan Wise".

Stan Wise  
Georgia Public Service Commissioner

The Honorable Gene Green**1. Why is it important that any collected alternative compliance payments remain in the state in which the compliance payments were made? Is there any local environmental or economic benefit for redistributing this funding to areas that already have high renewable energy capacity?**

If an RPS were enacted, it is imperative that the collected alternative compliance payments remain in the state which the compliance payments were paid. The alternative compliance payment is essentially a tax imposed on ratepayers for living in a region without an abundant supply of economic renewable energy resources. The redistribution of compliance payments outside of the region from which they were paid represents a wealth transfer, further hindering, economically and environmentally, regions that lack economic renewable energy. In allocating compliance payments, the funds should be distributed proportionately to the states which the compliance payments were paid. This action would promote state programs that stimulate or enhance innovative renewable energy technologies in regions that have a disproportionately small share of renewable energy generation capacity.

There is no local environmental or economic benefit for redistributing funding to areas that already have high renewable energy capacity. In fact, if this practice was implemented, regions lacking renewable energy would be hit twice, once when taxed and once when no regional or local benefit was received from the tax.

**2. Some RPS proposals include alternative compliance costs of 5 cents per kilowatt hour credits, while the RPS proposal supported in the House last Congress called for 1.9 cents. What would be the difference in bottom line cost for Georgia's ratepayers between these two different proposals if an RPS of 25% by 2025 were adopted?**

The potential impact of both scenarios is substantial to Georgia's ratepayers. The approximate 2025 impact to each customer type for each scenario is shown in the following table.

<b>Approximate RPS impact to GPC ratepayers</b>			
	<b>Residential</b>	<b>Commercial</b>	<b>Industrial</b>
<b>25% RPS by 2025 with 1.9 cents ACP</b>			
2008 \$/year increase	\$70	\$470	\$18,000
% increase	5%	6%	7.5%
<b>25% RPS by 2025 with 5 cents ACP</b>			
2008 \$/year increase	\$175	\$1,150	\$44,000
% increase	12.5%	14%	18.5%

The Honorable Joe Barton and the Honorable Fred Upton

**1. If we assume that many utilities will fall short of the RES mandate and end up paying millions of dollars in non-compliance fees, please explain how such a tax or rate increase on consumers helps the economy.**

Such a tax or rate increase will not help the economy. The rate increases imposed on Georgia's ratepayers, largely from non-compliance fees, decreases consumer spending and hinders the state's economic development. Georgia will quickly become less attractive economically to prospective businesses while current businesses incur higher operating expenses due to electricity rate increases.

**2. I know you're concerned that the Southeast is penalized under a national program because the region lacks sufficient wind or solar power. Proponents of a federal mandate, however, insist that the Southeast can meet the new requirement through the use of biomass. How do you respond?**

Numerous studies have been promoted in the past that purport to show the abundance of biomass in the Southeast compared to other regions. Biomass is a viable resource for some amount of electricity generation, but even with the amount of biomass present in the Southeast, the region cannot rely primarily on biomass to meet an RPS while maintaining the region's economic and environmental status. The potential to meet RPS requirements using primarily biomass is further hindered due to proposed biomass RPS definitions, which exclude certain biomass types as being regarded as renewable.

Unlike wind and solar resources, biomass is a resource that already serves numerous industries and markets besides electricity generation. Utilizing biomass at an RPS scale will inevitably displace use of the resource in other sectors, such as the pulp and paper and forestry industries. This is different than when wind or solar resources are harnessed for electricity generation. Also, as current U.S. policies mandating biofuel usage continue to take effect and potentially increase, the Southeast's biomass resource will become further strained while continuing to have negative economic impacts on the region's current industries.

Currently, Georgia is home to about 27 pulp and/or paper mills that ship \$10 billion in pulp and paperboard products worldwide, employ 26,000 Georgians, and have an annual payroll of \$1.2 billion. Forcing the electricity industry to enter into the biomass industry at an RPS scale will severely impact the pulp and paper industry among others. It is important that the Southeast utilize its biomass resource for electricity generation in an economic manner to eliminate resource depletion and the attendant increase in biomass and agricultural commodity prices.

**3. Some dismiss the argument that the RES will result in a wealth transfer from areas of the country that lack renewable resources to those that are blessed with them. As a state regulator, can you explain why you believe a federal mandate will result in increased rates for those in the Southeast?**

A federal mandate will result in increased rates for those in the Southeast because of the Southeast's lack of economic renewable energy resources. After installing the small amount of biomass and other renewables that will be economic, the Southeast will have to purchase renewable energy credits (RECs) and/or pay the alternative compliance payments to meet the RES requirements, both of which do not produce energy for their customers. Essentially, Southeastern ratepayers will pay twice for their energy. Ratepayers will pay for the purchase of RECs from renewable-rich regions and/or alternative compliance payments to the Federal government. Since there is no energy associated with these payments, the ratepayer will also pay for energy generation within their own region.

Regions that have an abundance of renewable energy resources will generate renewable energy while producing RECs, enabling them to meet their RES requirements and sell their additional RECs to other regions, like the Southeast, thus transferring wealth from the Southeast to other regions.

**4. Currently, does each state rely exclusively or substantially on fuels derived from that state to generate electricity? Particularly for the southeast, where does the fuel come from that currently provides electricity generation?**

The Southeast relies on fuels from inside and outside of the region. Almost two percent of Georgia's electricity generation comes from hydropower within their state. Most of the gas that Georgia Power Company (GPC) uses is delivered from Southern Natural Gas and Transco. The gas is from several areas, including the southeastern region such as the Gulf of Mexico, Alabama, and Mississippi. GPC uses fuel oil from Mississippi, Louisiana, and Texas. It gets nuclear fuel from companies with mines in Canada, Australia, Kazakhstan, Namibia, and the U.S., but the fabrication of the nuclear fuel into reactor assemblies or bundles occurs in North Carolina and South Carolina. GPC's coal comes from several regions, including the Central Appalachian region (which consists of Kentucky, Virginia, West Virginia, and Tennessee), and the Powder River Basin region in Wyoming, as well as some from the Southern Appalachian region in Alabama.

A ratepayer in Georgia pays other regions for fuel (e.g. coal) which generates electricity in Georgia. The ratepayers' benefit from the transaction is electricity. Implementation of an RES would force Georgia ratepayers to purchase renewable energy credits (RECs) from renewable-rich regions in order to meet a compliance obligation. Ratepayers are not benefiting from this transaction. It is essentially a tax on individuals who live in regions that lack an abundance of economic renewable resources. Since Georgia ratepayers do not receive energy due to the REC purchase, they will continue to pay to purchase fuel to generate electricity in their own region. In essence, an RES forces Georgia ratepayers to pay twice for the same commodity.

**5. If a given region lacks wind, solar or biomass resources, how does a government mandate promote their development in that region? How does the payment of**

**penalties to the government which do not necessarily recycle back to that region promote that development?**

A government mandate will not promote the adoption of renewable resources in regions where they are not available. The Southeast's potential renewable energy generation is less than other regions due to a lack of renewable resources. A government mandate would not promote renewable energy in the Southeast to the degree it would in other regions. Biomass is currently the only potential economic renewable resource in the Southeast. Limitations exist on the extent to which this resource can be developed. Forcing the Southeast to comply with an RES using primarily biomass will have a detrimental impact on current industries that rely on biomass. Southeastern retail electric suppliers will be forced to purchase renewable energy credits from other generators and/or pay the alternative compliance payment due to the region's lack of renewable resources.

An RES would essentially tax the Southeast for the lack of renewable resources present. Penalty payments to the government will not increase the renewable resource in the Southeast. Renewable technology development will also be hampered in the Southeast if the penalty payments do not recycle back to the region. In contrast, the government could fruitfully promote research to bring renewable energy technology to economic viability in regions with low natural renewable resources (e.g., the development of wind turbines that provide power at low wind speeds).

**6. Do you agree that as it now stands, our country's transmission infrastructure is woefully inadequate to achieve a 20% by 2020 RES requirement?**

No. While I cannot vouch for other areas of the country, the transmission system in the Southeast is robust. The following support is provided for this fact:

- Today, the existing bulk transmission system within SERC as a whole totals 49,994 miles of transmission lines.<sup>1</sup> In transmission circuit miles of over 200 kV, SERC had 32,295 miles existing in 2007, the highest among the Councils in the Eastern Interconnection and second only to the Western Electricity Coordinated Council ("WECC"),<sup>2</sup> which covers over 3 times SERC's square mileage.<sup>3</sup> In terms of investment, the SERC members have \$1.262 billion in transmission system upgrades 100 kV and above in 2007, and six consecutive years they reported at least 20% of all planned transmission expansion in the United States.<sup>4</sup> For 2008-2012, SERC plans to add 1,676 more transmission circuit miles over 200 kV and

<sup>1</sup> NERC 2008 Long-Term Reliability Assessment at 189-90 ("NERC 2008 Assessment"). The NERC 2008 Assessment is available at: <http://www.nerc.com/files/LTRA2008.pdf>

<sup>2</sup> *Id.*, at 15.

<sup>3</sup> SERC is the fourth largest of the eight NERC councils, covering 560,000 square miles. *Id.*, at 214. By way of comparison, WECC covers nearly 1.8 million square miles. *Id.*, at 264.

<sup>4</sup> *Id.*, at 190.

invest yearly expenditures on transmission of over \$1.6 billion from 2008-2012.<sup>5</sup>

- In the State of Georgia, our Commission regulates Georgia Power Company, a subsidiary of the Southern Company. Southern Company embodies this commitment to a robust Southeastern transmission system, with transmission assets totaling approximately \$5.4 billion, with \$1.1 billion invested from 2005-2007.<sup>6</sup>

FERC has recognized that the utilities in the Southeast have adequately invested in transmission, with Chairman Kelliher having noted at a FERC technical conference that the Southeast has done “a very good job on investing in transmission...”  
Conference on Competition in Wholesale Power Markets, Technical Conference Transcript, at 217  
 Docket No. AD07-7-000 (Feb. 27, 2007).

- In addition, I personally participated in the Department of Energy’s (“DOE”) July 29, 2008 regional workshop that was held in Atlanta, Georgia (“Atlanta DOE Workshop”) to facilitate the DOE’s preparation of its 2009 transmission congestion study.<sup>7</sup> The consensus of the speakers was that there are no congestion problems in Southern Company’s footprint or in the service territories of many of their neighboring transmission providers.<sup>8</sup>
- For the most part, the speakers on the first panel (myself included) at the Atlanta DOE Workshop emphasized that congestion is not an issue in their respective states. With regard to Georgia, and as I explained at the workshop, long-term congestion is addressed through Georgia’s well-established Integrated Resource Planning (“IRP”) and Request for Proposals (“RFP”) processes. These processes ensure that generation and transmission additions are jointly planned so that least-cost solutions are

<sup>5</sup> Id., at 15. SERC plans to add over \$8.66 billion in transmission over the next five years. Id.

<sup>6</sup> The Southern Company, “Transmission” available at: <http://www.southerncompany.com/transmission/>

<sup>7</sup> Section 216 of the Federal Power Act (“FPA”) requires DOE to perform such a congestion study every three years.

<sup>8</sup> In fact, the lack of transmission congestion in this region compared to that described in other regions of the country at other workshops led the DOE facilitator at the conference, Mr. David Meyer, to ask why the Southeast was so successful in avoiding transmission congestion compared to other regions of the country. See Pre-Congestion Study Regional Workshop for the 2009 National Electric Congestion Study, Atlanta, Georgia, Transcript at 18 (July 29, 2008) (“[W]hy is your process working, or is has in the past worked and now you’re reaping the benefits, but is there some particular reason that comes to minds as to why that – as compared to other areas?”). This transcript is available at

[http://congestion09.anl.gov/documents/docs/Transcript\\_Pre\\_2009\\_Congestion\\_Study\\_Atlanta.pdf](http://congestion09.anl.gov/documents/docs/Transcript_Pre_2009_Congestion_Study_Atlanta.pdf)

adopted to address identified needs and problems. Through these processes, if a generation option is identified as the least-cost solution, then the transmission improvements necessary to ensure that the generation proposal can serve load without congestion during the period of designation are similarly identified and placed into service. In this manner, the generation that serves Georgia consumers does so without experiencing long-term congestion because adequate transmission improvements are made to ensure delivery of the resources.

Moreover, the question raised seems to imply that the transmission system is the chief impediment to achieving a 20% RES by 2020. This assumption appears questionable, with cost competitiveness, intermittent supply, and land use issues arguably posing the most significant challenges to deploying renewables en masse. Concerning land use, it bears noting that DOE's *20% Wind Energy by 2030* study at p. 10 states "new land-based [wind] installations would require approximately 50,000 square kilometers (km<sup>2</sup>) of land" to meet the 20% wind target contained in that study. By way of comparison, the State of West Virginia encompasses approximately 63,000 km<sup>2</sup>.

The focus on transmission infrastructure in the renewables debate appears to be based upon a false assumption that meeting an RES requires the physical delivery of large amounts of intermittent wind energy from the Midwest and Southwest to distant load centers in the East. Such deliveries are not necessarily economic or desirable. While transmission expansion will be required within the Midwest and Southwest to integrate economic levels of wind generation to serve regional loads, the same is true for transmission that is required to integrate any other generation options (i.e. potential transmission expansion is not unique to renewable resources). Transmission needs in the Midwest may also reflect its history of lower levels of transmission expansion.

Conversely, in the Southeast and the State of Georgia in particular, there is a longstanding practice of performing Integrated Resource Planning, whereby transmission expansion needs are integrated coincident with resource addition decisions. This results in low costs and reliable service for Georgia customers. It does not appear to be necessary or economical to unilaterally export wind energy to distant regions. Instead of such super-distant transfers, the economics of such transactions must be weighed against local options and must stand on their own merits, including the cost of delivery services.

Each state should identify the particular mix of resources which most reliably and economically meets its needs, and integrate these resources in the most cost effective manner. In the Southeast, Georgia Power is pursuing both local base load renewables (such as the Mitchell biomass plant) and distributed renewables (such as solar), neither of which relies upon interstate transmission. Southern Company is expanding their transmission system locally as needed to integrate these renewables, along with zero carbon resources such as the new Vogtle nuclear units that will be jointly owned by several entities in Georgia. As indicated above, Southern Company's existing transmission interfaces have the capacity to import significant amounts of energy both at peak and during the off-peak periods when wind energy is most abundant. For many years, utilities in the Southeast have participated in active and effective regional planning

activities which support transmission expansion to facilitate economic inter-regional transfers for their customers.

In summary, from my perspective as a State Commissioner in the Southeast, I just cannot agree that the transmission infrastructure is inadequate to meet an RES requirement. Utilities in the Southeast continue to make substantial investments in transmission and if Congress passes legislation that includes an RES requirement, the existing Integrated Resource Planning and Regional Transmission Planning processes should be adequate to allow utilities, on behalf of their customers, to make least cost decisions to comply with such a requirement. I encourage your Committee to include principles in any RES proposal that provides load serving entities with flexibility in meeting the requirements and avoids subsidization of costs by consumers in regions that have limited renewable resource options.

**7. How much back up power from conventional power plants is needed to meet a 20% RES requirement by 2021? At what cost?**

Nationally, to meet a 20% RES, significant backup power will be required. Solar and wind resources provide an intermittent electricity generation source. Capacity factors for these resources, as stated in the DOE Energy Information Administration's Annual Energy Outlook 2009 Early Release, are around 21% for a solar photovoltaic central station generator and around 35% for onshore wind. These capacity factors are not adequate for baseload generation. To compensate for the discontinuous electricity generation from wind and solar resources, additional generation is needed to provide quick, timely, and dependable electricity. The additional generation will primarily come from natural gas facilities. Natural gas' quick start capability would be needed to provide spinning reserves or constantly running backup power required for intermittent resources like wind and solar.

Retail electric suppliers in the Southeast will use a mixture of four compliance options to satisfy an RES. Retail electric suppliers will build/purchase renewable energy, install/increase energy efficiency measures, buy renewable energy credits from other generators, and/or pay the alternative compliance payment. Due to the renewable resource limitations in the Southeast, building renewable energy will primarily consist of a limited amount of biomass. Unlike wind and solar, biomass does not require backup generation due to its capacity factor. Since biomass, the main renewable resource in the Southeast, cannot solely meet RES requirements, retail electric suppliers will be forced to buy renewable energy credits from other generators and/or pay the alternative compliance payment.

The Honorable Tammy Baldwin**Solar Light Pipe Technology:**

**1. There exist a number of distributed renewable energy resources such as solar water heaters, solar light pipes, solar air heating and cooling, and geothermal heat pumps that deliver measurable and verifiable renewable energy at the load source. These technologies help businesses and homeowners lower their utility bills; and because they produce clean energy at the load source, they certainly lessen the burden on our nation's transmission infrastructure. As I understand, some states have included these technologies in their renewable portfolio standards. Do you think these types of technologies should be considered renewable energy technologies and can they provide benefits under a national renewable portfolio standard?**

Distributed technologies such as solar water hot heaters, solar light pipes, solar air heating and cooling, and geothermal heat pumps should all be considered as renewable energy technologies. The ability to get credit towards a national renewable portfolio standard (RPS) from use of these distributed renewable energy technologies by the local utility will be challenging.

The challenges may be:

1 – The homeowner can add these technologies to reduce the load at their home without informing the local utility.

2 – Some of these technologies, such as solar light pipes, will save energy use in the home, but being able to document how much energy is actually being saved from the use of these technologies will be very hard. For example, solar light pipes keep the homeowner from having to turn on lights in a room, but the number of lights not being used in the room will vary depending on the use of the room and the occupancy in the room. Another example will be the use of passive solar space heating and cooling. The question again comes up as to how to measure the energy savings from this technology and document this energy savings.

3 – Measurement devices have not been developed or are being developed that will give a value to the renewable energy being generated and the electricity produced from fossil fuels displaced. Some states such as California have developed methods to estimate the production of other solar generation technologies. If a method is developed, consideration for regional differences needs to be implemented in these estimations.

4 – Integrating technologies to provide customers with information about resource value and cost savings. Establishing a smart grid will allow the coordination of these demand-side technologies, but it will take time and additional investment to provide customers with the necessary information to optimize use of the resources. Advanced Metering Infrastructure (AMI) is currently being installed but this is only one of the first steps in establishing a smart grid.

There are some examples of successful integration of these sources. For example, Lakeland Electric has established a method for a local utility to take credit for solar hot water heating. This utility currently use a Metrima meter

(<http://tetsolar.com/tctunetrima.htm>) which is installed at a customer's home to record the BTU output from a solar hot water heater and charge the customer a hot water charge based on this measurement. With the Lakeland Electric model, it would be easy for the local utility to determine the credits that have been generated and can be credited towards a national RPS. However, in a model where the homeowner installs the renewable equipment to reduce their home energy use, it will be hard to determine the amount of credit a local utility would be able to claim on the goal established by a national RPS. One option is to provide a rebate or incentive for the homeowner to report the installation of specific technologies to the utility, but the utility needs to insure that the renewable energy technology is actually being used or only give a customer a performance-based incentive. For example, no rebate or incentive should be given to a homeowner who installs a solar technology in an area that has a large amount of shade.

**2. How is energy derived from these technologies generally measured?**

Technology	Energy	Measured
Photovoltaics	Electricity	Kwh
Solar Hot Water	Hot water	BTU
Solar Light Pipes	Light intensity	Lumens
Solar Air Heating and Cooling	Conditioned air	Tons
Geothermal Heat Pumps	Conditioned air	Tons

**Follow-up Questions from Mr. Ralph Izzo, President, Chairman and CEO  
Public Service Enterprise Group  
Subcommittee on Energy and Environment February 26, 2006  
Hearing on  
“Renewable Energy: Complementary Policies for Climate Legislation**

**Representative Gene Green**

- 1) I share your concern for the impact of increased electricity prices on low and middle income Americans and also support LIHEAP and energy efficiency programs. Some RPS legislative proposals create funds in which alternative compliance payments are deposited and distributed in some form back to electricity suppliers. Most funds would go to suppliers that have the most renewable energy capacity.

Would you also support efforts, similar to the LIHEAP program, to distribute some funding from alternative compliance payments back to low and moderate income families to help them pay their higher energy costs under the RPS program, particularly from areas unable to meet renewable energy targets?

**Answer:** I believe it is critical to adequately fund assistance programs that help low- and moderate-income families pay their energy bills. If Congress deems it appropriate to use a portion of the funds from Alternative Compliance Payments to help vulnerable families pay their bills, I would support that decision.

**Representatives Barton and Upton**

1. Since you testified to support the RES mandate, I assume you have done a cost analysis, is that correct?
- a) What does that analysis tell you?
  - b) Have you factored all the costs into your equation? Such as the cost of building new transmission to bring renewable power to load centers? What about the cost of back-up capacity that will be needed to support a large increase in capacity from intermittent generation sources?

**Answer 1a:** The vast majority of scientists believe we must dramatically reduce carbon emissions over the next 40 years – on the order of an 80% reduction – to avoid catastrophic impacts from climate change. So I start with the premise that we must take aggressive action today on multiple fronts – investing in energy efficiency, promoting renewable electric generation, electrifying our transportation sector, investing heavily in clean energy research and development, and exploring new nuclear generation.

We must pursue these policies in a way that balances our need to fight climate change with the financial concerns of the families and businesses that will pay any increased costs associated with these policies. I believe the RES bills being considered by Congress strike the right balance between these two considerations. Achieving roughly

20% renewable generation by 2020 or 25% by 2025 will be challenging, but it also only gets us a fraction of where we need to be to reach our 2050 carbon reduction goals. At the same time, the alternative compliance payment puts a cap on the price impact of an RES. The draft bills being circulated in the Senate and House put that price cap at between 3 cents and 5 cents per kilowatt hour. Therefore, if we required 20% renewable energy by 2020, under the worst case scenario, customers would pay an additional 5 cents per kilowatt hour for 20% of their electricity, or an additional 1 cent per kilowatt hour for all of their electricity.

**Answer 1b:** The amount of backup power or new transmission that we be needed to meet the RES is entirely dependent on what type of renewable generation is developed and where it is located. Some types of renewable generation, such as biomass or geothermal energy, deliver consistent and reliable power and can be treated much like traditional generation assets. Intermittent renewable generation resources will need back up power at times, but with a diversity of generation resources, the use of demand response, and improved energy storage technologies – such compressed air storage – we can improve reliability and help minimize any additional cost.

Similarly, heavy investment in Midwest wind could increase the need for new transmission infrastructure. However, offshore wind is a renewable resource that can be located very close to areas of high electricity demand. The RES and other national energy policies should be constructed in a way that recognizes these cost differences, so we can make rational economic choices about meeting RES requirements in the most cost-effective manner.

Lastly, a cost-benefit analysis would presuppose that the market is capable of efficiently pricing externalities, such as climate change or energy security, which it is not. Renewables are more expensive today than conventional sources of electricity. However, these conventional sources impose costs on future generations that are difficult to quantify.

- 2) Wouldn't you agree that Congress ought to know the costs of any proposed carve-out for renewable power before it approves one? Wouldn't you agree that all the relevant costs ought to be factored into that analysis, rather than just some of the costs?

**Answer:** As noted in my prior answer, there are many variables that will affect how much it will cost to meet the RES, including what kind of renewable generation we build, where we build it, the capacity factor of that power, the impacts of other federal energy policies, the impacts of various state-level renewable energy policies, and the advent of emerging renewable technologies. What we do know for certain, is that RES legislation will set a cap on the price of the program through the alternative compliance payment. Therefore, we can model the most costly scenario and weigh that cost against the need to act quickly and aggressively to combat climate change and promote economic development in the renewable energy industry.

- 3) Would you concede that wind and solar plants need back-up? How much back-up does wind power need? How much for solar? Until storage is available, what plants will supply that back-up? Does the operation of those back-up plants make attainment of the RES any more difficult?

**Answer:** Yes, wind and solar generation will need backup supply. The amount and cost of backup generation that will be necessary is dependent on many variables, including what mix of renewable generation is developed, where it is located, and the existing generation assets available in the region. Therefore, it is difficult to predict with much accuracy how much back up power would be needed, and at what cost. Some types of renewable generation, such as biomass or geothermal energy deliver consistent and reliable power and can be treated much like traditional generation assets. Intermittent renewable generation resources will need back up power at times, but with a diversity of generation resources, the use of demand response, and improved energy storage technologies – such as compressed air storage – we can improve reliability and help minimize the need for backup power.

- 4) In your testimony you indicted that PSEG is “already beginning to invest heavily in alternative energy.” What are your calculations or estimates for how much rates will increase or decrease as a result of your alternative energy investments?

**Answer:** PSEG has two companies that are investing in renewable energy generation – our regulated utility and an unregulated generation company. Our utility is currently implementing a program under which we will invest roughly \$105 million to finance solar installations in New Jersey. This program is projected to increase rates for the average residential customer by less than 3 cents per month. Our utility also has a proposal before our regulators under which we would invest \$773 million over five years to develop and own 120 megawatts of solar generation. This program would cost the average residential customer roughly 10 to 35 cents per month. However, it must be noted that these programs will meet less than 1% of New Jersey’s peak demand. These investments in solar are more expensive than conventional energy investments over the short-term but are intended to help New Jersey meet its aggressive solar energy goals.

Our unregulated generation company is developing a 350 megawatt offshore wind farm, as well as other solar and renewable generation projects. We have also invested in compressed air energy storage technology, which can accompany intermittent renewable generation and make it more reliable and economical. These projects will not be directly paid for through utility rates; however, they will require revenue from market-based renewable energy credits.

- 5) What specifically is the fallacy of a policy that allows each state or region to craft its own approach to developing renewable or clean sources of energy?

**Answer:** A national approach is necessary to achieve the scale of carbon reductions that scientists say we need to avoid catastrophic climate change. Moreover, a national RES allows us to invest in renewable energy at the lowest overall cost to customers, because it drives investments toward the most productive and lowest cost renewable generation. Finally, a national program will maximize the economic development and job growth benefits of this policy by increasing America's ability to attract renewable manufacturers and grow renewable industries.

- 6) Would you agree that by including nuclear power in a RES we can have greater reductions in CO2 and keep costs in check?

**Answer:** To achieve necessary carbon reductions, we will need to develop new nuclear capabilities *and* aggressively promote renewable electric generation. Therefore, I do not believe nuclear energy should displace the investments in renewable generation proposed in the RES bills being considered by this Congress. Moreover, nuclear energy is not a renewable resource, and the challenges for building new nuclear are different than the challenges of growing renewable energy industries. Nuclear power requires a very large, up-front capital investment; it has a very long construction time; and it faces unique regulatory hurdles. We need federal support for new nuclear generation, but that support is not best delivered through an RES.

- 7) As Massachusetts has already discovered, implementing an RES is far more difficult than passing the legislation itself. CapeWind, the proposed wind farm off Cape Cod, is stalled and Massachusetts is badly behind in meeting its RES. Even beyond siting the wind farms, states and the federal government would have to expedite permitting and obtaining the land and permission to build transmission lines, as well as provide resources to review interconnection applications quickly. How do you States get around these inherent problems without paying penalties or raising consumer rates exponentially?

**Answer:** Every form of electric generation, whether it's renewable or non-renewable, faces development challenges, including siting, permitting and regulatory hurdles. As you note, offshore wind faces some particularly unique challenges, many of which stem from the fact that such facilities have never been built off the coast of our country. To overcome these challenges, we need productive working relationships among renewable energy developers, local communities, environmental and consumer advocates, and local, state and federal governments. We have such a positive working relationship in New Jersey and we are hoping it allows us to make a major investment in offshore wind generation. Our chances of success are also increased by the fact that, unlike Cape Wind, our wind farm would be roughly 17 miles off shore, virtually out of sight from the coast.

However, while Massachusetts has faced some challenges meeting its RES targets – and the Cape Wind project has been particularly difficult to develop – it is also an example of how a market-driven approach such as an RES can work. From 2004 to 2006,

Massachusetts fell short of its RES requirements, and customers paid alternative compliance payments. However, the market signals from the RES stimulated investment in renewable generation, and in 2007 Massachusetts exceeded its RES targets.

