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RENEWABLE ELECTRICITY STANDARDS: LIGHTING THE WAY

HEARING

BEFORE THE

SELECT COMMITTEE ON
ENERGY INDEPENDENCE
AND GLOBAL WARMING
HOUSE OF REPRESENTATIVES

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RENEWABLE ELECTRICITY STANDARDS: LIGHTING THE WAY

THURSDAY, SEPTEMBER 20, 2007

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

The Committee met, pursuant to call, at 9:00 a.m., in Room 2175 Rayburn House Office Building, Hon. Edward J. Markey [chairman of the Committee] presiding.

Present: Representatives Markey, Blumenauer, Inslee, Herseth, Cleaver, Hall, McNerney, Sensenbrenner, Walden, and Blackburn.

Staff Present: Morgan Gray and Jonathan Phillips.

Also Present: Representative Udall of Colorado.

The CHAIRMAN. This hearing is called to order. The emission of heat trapping gases from electric power plants is a huge source of global warming pollution in our country and around the world. If we are to solve this problem, we need to transform this process into one that provides us the power we need from safe, clean, affordable sources of electricity, starting immediately. Right now the combustion of fossil fuels like coal, oil, and natural gas produce the majority of U.S. electricity, over 70 percent. And it's responsible for about 40 percent of carbon dioxide emissions. Excluding hydropower, renewables make up just 2.4 percent of electricity generation in the United States.

The good news is that the way we generate electricity is beginning to change. Last year, over 2400 megawatts of new generating capacity were added across the country from wind trailing only the new capacity added from natural gas. Meanwhile, last year, we added only 600 megawatts of new capacity from coal and no additional capacity from nuclear.

This year, projections indicate that we are going to add between 3,000 and 4,000 new megawatts of wind capacity and that is big news. This increased use of wind and other renewable technologies such as solar, biomass, and geothermal, is due in part, to the states that have been taking the lead in requiring the production of renewable electricity.

Across the country, there has been a groundswell of public support for changing the way we generate electricity. Currently, 25 states and the District of Columbia have put in place Renewable Electricity Standards. A state Renewable Electricity Standard may vary in how much renewable electricity it requires or its definition of eligible renewable projects, but all share the same goal, to move our electricity sector away from fossil fuels that produce global warming pollution and towards clean, renewable technologies.

That will be the goal of our hearing today. We thank all who are going to participate. The Energy Bill was just passed in August, adopting an amendment from Representative Tom Udall and Todd Platts, working with Congressman Mark Udall from Colorado which created a national Renewable Electricity Standard requiring that 15 percent of our electricity come from renewable sources and efficiency by the year 2020. That was a big moment on the House Floor and it portends big things to happen before the end of this year. That completes the opening statement from the chair.

I now turn and recognize the Ranking Member of the Select Committee, the gentleman from Wisconsin, Mr. Sensenbrenner.

[The prepared statement of Mr. Markey follows:]

Opening Statement for Chairman Edward J. Markey
"Renewable Electricity Standards: Lighting the Way"
Select Committee on Energy Independence and Global Warming
September 20, 2007

This hearing is called to order.

The electric power industry is responsible for roughly 40 percent of U.S. carbon dioxide emissions, the most prevalent of the heat-trapping gases causing global warming. Right now, the combustion of fossil fuels like coal, oil, and natural gas produce the majority of U.S. electricity -- over 70 percent. Meanwhile, excluding hydropower, renewables like wind, solar, biomass, and geothermal make up just 2.4 percent of electricity generation in the United States.

However, the way that we generate electricity is beginning to change. Last year, over 2,400 megawatts of new generating capacity were added across the country from wind, trailing only the new capacity added from natural gas. Meanwhile, last year we added only 600 megawatts of new capacity from coal and no additional capacity from nuclear power. This year, projections indicate that we are going to add over 3,000 megawatts of new wind capacity – maybe even as much as 4,000.

This increased use of wind and other renewable technologies is due, in part, to the states that have been taking the lead in requiring the production of renewable electricity. Across the country there has been a groundswell of public support for changing the way we generate

electricity. Currently, 25 states and the District have put in place renewable electricity standards. A state renewable electricity standard, or RES,.may vary in how much renewable electricity it requires or its definition of eligible renewable projects, but all RESs share the same goal – to move our electricity sector away from fossil fuels that produce global warming pollution and towards clean, renewable technologies.

A recent study reviewed the effectiveness of state renewable electricity standards on fostering the development of renewable technologies and found that the majority of new renewable electricity is being built in states with RESs. The analysis found that in 2006, more than two-thirds of new renewable generating capacity was added in states that had an RES and the trend is continuing this year, with more than 70 percent of the planned 2007 additions in renewable capacity similarly occurring in RES states.

As part of the energy bill that passed the House in August, the House adopted an amendment from Representatives Tom Udall and Todd Platts, which created a national renewable electricity standard requiring that 15 percent of our electricity come from renewable sources and efficiency by 2020. Adopting a national RES will ensure that there is a market for these technologies here in the United States in order to spur investment and development of these emerging technologies.

Moreover, adopting a national RES will help spur economic development and job creation as part of an

emerging sector of "green collar jobs." In addition, many of the jobs and economic benefits of a national RES would occur in rural areas.

This Congress was sent here with a mandate to change the direction of our energy policy. Adopting a national renewable electricity standard like the one contained in the House energy bill would be a critical step forward in reducing our global warming pollution from electrical generation while also creating new economic opportunities in a green economy. Our dependence on fossil fuels is our weakness but our strength is our innovation and technology. Adopting a national RES would unleash our technological genius and make America a world leader in the development of these technologies.

And now I would like to recognize the Ranking Member of the Select Committee, the gentleman from Wisconsin, Mr. Sensenbrenner.

Mr. SENSENBRENNER. Thank you very much, Mr. Chairman. It shouldn't surprise you to know that I support the development of renewable energy including wind, solar, biomass, and hydroelectric power. Week after week, Republicans on this Panel have said that technology provides the only real path to a global warming solution. We can't stop using energy, but we can develop ways to create energy without releasing CO_2. It may also not surprise you to know that I voted against government regulations requiring power companies to include renewable energy as one of its sources.

So how can I say I'm for renewable energy and then vote against requiring it? The answer is simple. Because I firmly believe that if we were to find realistic global warming solutions, Congress should encourage technological competition, but must not pick who wins and who loses. By requiring electric utilities to generate a portion of their energy through renewable sources, the government is picking the winners and in these cases the winners will be certain types of renewable sources. The problem with the renewable portfolio is that it emphasizes the means and not the ends. After all, the goal is to reduce greenhouse gas emissions. And in July, the House passed legislation that requires utilities to use renewable sources to produce 15 percent of its electricity.

I am skeptical of most regulation. But this one is particularly onerous because it discounts the progress some electric utilities have made and only because they use methods not favored by certain congressional leaders. One utility that would fall prey to this terrible idea is the Southern Company and I am happy to welcome Mr. Chris Hobson, the company's Senior Vice President for Research and Environmental Affairs. Should this bad policy ever become law, utilities that are able to meet the renewable standards would presumably produce 15 percent of its electricity without producing any CO_2, and that would be progress.

But not for the Southern Company. As Mr. Hobson will testify, 18 percent of the electricity generated by the Southern Company today emits no carbon dioxide whatsoever. So the Southern Company has nothing to worry about with these regulations, right? Wrong. Unfortunately, the Southern Company has big worries and so should all of its rate payers with 15 percent of its electricity generated by nuclear power and another 3 percent from hydropower, Southern Company has already met the emissions cuts required these proposed regulations seek to create. But because the utility doesn't employ the use of wind turbines or solar panels, it will be forced to pay government fees for its failure to comply. And that will likely cost the company a billion dollars a year which will be passed on in every rate payers' monthly bill.

Like all smart energy utilities, the Southern Company is researching its renewable energy options, but in the areas in the South it serves, are not conducive to many forms of renewable energy. The South has simply too much clouds and not enough wind, if these regulations come to pass and Southerners will literally pay the price for their geographic location.

Congress should be promoting technological solutions to global warming, not picking which technology is its favorite. That isn't a path to a solution. It's only a path to higher electricity bills. Additionally, I'd like to welcome Governor Ritter to the Committee. The

Governor is here to talk about Colorado's new energy economy and its goals of the 20 percent renewable standard. A recent report commissioned by the State Legislature shows that Colorado does have an energy economy that produces 70,000 jobs, $640 million in tax revenue and adds $22.9 billion to the state's economy. Of course, that energy economy comes from the oil and gas sector, and I suspect renewable energy has far less impact on Colorado. So I'm curious to hear how the Governor plans to nurture a new energy economy without slowing an oil and gas sector that appears to be a foundation to the state's economy.

I thank the chair.

The CHAIRMAN. The gentleman's time has expired. The Governor can only stay until 10 o'clock.

Mr. BLUMENAUER. I have no plans to speak longer than even a portion of that, Mr. Chairman.

The CHAIRMAN. The gentleman from Oregon is recognized.

Mr. BLUMENAUER. Thank you, and I appreciate your admonition and I will try and be brief and to the point. But it's just one of those rare occasions when I disagree with my respected friend, the Ranking Republican Member as when he equated the amount of electricity that was consumed by a country as progress. Here, I couldn't disagree more with our action that we took with the leadership of our friend from Colorado, Mr. Udall, you, Mr. Chairman, our speaker, in establishing a national renewable portfolio standard.

We're not about picking winners and losers. We're about setting a framework for a broad effort to incent the appropriate range of options for generating energy for the future. I look forward to hearing from Governor Ritter and our friend, Mr. Udall, because part of what they have done is create their own renewable portfolio standard, approved overwhelmingly by their voters.

We are in the process of doing this state by state across the country. The question is whether the federal government will catch up and be able to do it as well. And that is why I'm pleased to welcome Nancy Floyd who will be speaking in a moment because she, as the founder and managing partner of Nth Power, the first venture capital company in the world dedicated to these renewable energy technologies, you're going to help operationalize it. But I think, as part of her testimony which I hope my friend from Wisconsin will have a chance to listen. It's inconsistent policies of the federal government have lost our lead in areas like wind and solar and we need a full range of consistent federal policies like a renewable portfolio standard to be able to give the proper incentive.

I think Florida is still the Sunshine State, but we heard some of our colleagues' concern that they couldn't deal with solar. I think it's time for us to have a wake up call. I appreciate your scheduling this hearing and being able to hone in on how we'll accomplish that and I hope I have allowed time for the Governor to speak before 10.

Thank you, Mr Chair.

The CHAIRMAN. Thank you. I would ask the other Members if they wouldn't mind that we allow the Governor to testify at this time and then we will—when he has completed his testimony, have the other Members then make their opening statements. And we

will begin by recognizing our colleague from the State of Colorado, Mark Udall. Mark, along with his cousin, Tom, and Todd Platts, its leadership, and the debate which we had in the first week of August on the House Floor on increasing the national standard for renewables and efficiency to 15 percent per year by the Year 2020, he's been a leader throughout his entire career going back to the Colorado State House on the issue.

Welcome, Mark, and whenever you're ready, please begin.

Mr. UDALL of Colorado. Thank you, Mr. Chairman. In the spirit of assuring that the Governor has plenty of time to tell you about the great successes in Colorado, I'd like to ask that the full text of my introduction which is noteworthy and full of a lot of substance be included in the record and I'll shorten my introduction of the Governor.

The CHAIRMAN. Without objection. We'll set aside one full textbook for that.

Mr. UDALL of Colorado. Let me just tell you that the Governor, he's widely respected and popular in Colorado and that's in many ways because during his short time in office, less than a year, he's reformed many of our natural resource policies which require us to be responsible in how we develop and protect our air and our water and our land. He's working towards creating a 21st century transportation system which Mr. Blumenauer would be very interested in, I know. And he's also focused on the statewide health care which, of course, we need to do here at the federal level. And he's made a real point of making sure that we have the best K through 12 and higher education levels.

But most importantly, he's quickly established the State of Colorado as a leader in renewable energy by doubling our state's Renewable Electricity Standard.

In 2004, we were the first voters in the country to establish a Renewable Electricity Standard which was known as Amendment 37 and we did that in a bipartisan way. I was fortunate to chair the committee, the state-wide committee, with our Republican Speaker of the House, Lola Spradley. And then this year in bipartisan fashion, our legislature doubled the RES requirement to 20 percent by 2020, I believe, and Governor Ritter signed that into law. So I'm very pleased he's here today tell you about the successes in Colorado and what we envision for the future, not just in Colorado, but for this great country of ours. So it's a real honor to introduce the Governor of Colorado, Bill Ritter.

The CHAIRMAN. If you're ready, please begin, Governor.

STATEMENT OF BILL RITTER, GOVERNOR OF THE STATE OF COLORADO

Governor RITTER. Thank you, Mr. Chairman, Chairman Markey, Representative Sensenbrenner, Members of the Committee, Representative Udall, it's really a pleasure to be able to be here and be invited to testify, and so I thank you for that. I also have read remarks that I would ask to be entered as part of the record and I'll make brief remarks in lieu of that.

I want to offer Congressman Udall a thank you for his introduction and also for all the work that he has done that relates to Colorado's own energy economy issues and natural resource issues. He

is a strong partner in our efforts and I will talk a little bit about what we call the new energy economy. As Representative Udall referenced, we passed Amendment 37 by an overwhelming margin, actually in 2004. I think at the time, it was the first voter-led initiative that established a Renewable Energy Standard.

It is really about that that I am here to testify here today about the efforts that we've made since I have been inaugurated as the Governor of the State. But so many of those things have their foundation in Amendment 37. It really goes back to the conversations we had then, when our largest utility in the state came in and really opposed the passage of Amendment 37 for many of the same reasons you hear that people are against either a federal standard or other state Renewable Energy Standards, things like it would cost the rate payers an added amount of money that we can't get to the place that were set in the standard. We set it at ten percent by 2015.

When we proposed a bill this year that ultimately was passed by both Houses and I signed into law, our biggest ally, really our biggest ally was the same utility who had opposed Amendment 37. And that's because they found how easy really in a sense it was to begin making their way toward the standard that was set by the voters initially. Remember it was ten percent by 2015. We will get to ten percent by the end of this year. So eight years early, we're going to get to that ten percent mark in Colorado and we have ongoing testimony by that utility that talks about in front of our PUC will come in and talk about least-cost options as part of our utility commission's standard when they're asking how we're going to generate electricity. The least-cost options actually include the generation of wind as a part of that.

We have seen that utility come in now and be an ally and us resetting the standard at 20 percent by 2020. We passed it through both Houses. I signed it into law. That utility, like I said, was a partner in that, but our rural electric associations initially had been carved out of Amendment 37. When we proposed this House Bill 1281 that was our new standard, 20 percent by 2020, all but one REA in the state came in and again supported our efforts and were, I think, happy to do so. So we were able to reset the standard.

What we've seen is this, and the reason I think to your point, Mr. Sensenbrenner, about why we call it the new energy economy. We have a very robust traditional energy economy. The extractive industries, oil, coal, and gas, they are a big part of our economy. But we call it the new energy economy because it melds the two things and it has absolutely been significant in economic development for us to focus on renewable energy economy in tandem with that.

People who view these two economies as one in lieu of the other I think are wrong to do that, especially in a state like Colorado where there is robust attractive industry activity, industrial activity going on. But we're missing a real opportunity prior to our setting the mandate and in since setting the mandate, some of the things that have happened have been, I think, just fairly significant especially to some areas where we needed to add value to the economy, quite frankly.

In the east, we have wind farms being built. Since I've been inaugurated, we've had ground breaking on several different wind farms up and down the eastern plains. We have one of the largest solar plants in the county being built in our San Luis Valley where there is a lot of sun. We have great geothermal possibilities. But we've also been able to participate in the vertical part of that industry. A Danish company built its first manufacturing plant in Colorado, Vesta Blades, so it's manufacturing those rotor blades.

Just recently had another announcement about a company, ABA, that is going to co-locate with Colorado State University and build manufacturing plants for a thin film photovoltaic. Those kinds of things are our ability to take this renewable energy economy and create jobs, both in agricultural areas, but also in manufacturing areas and to really add value to an economy that in many respects, as I said, needed that to happen.

If you think about the consequences environmentally, which are all positive, if you think about the things that we do with respect to economic development and you add to that the part that we can play in over time energy independence as a country, we really do believe that it has this great trifecta impact on us as a state, certainly, and really on us as a country.

Finally, I would say this to Mr. Blumenauer's point, with respect to what the states are doing. The western governors, the national governors, we are paying attention to this issue and in many respects when we get together, it is the thing we talk about most. Education is right up there, but we talk about the things that we are doing as states and it very much has to do with the frustration of there not being a federal policy that supports us the way we do.

Finally, I would say this. In a coal-producing state, we are also about clean coal. We really believe that this body, the federal government, needs to do all they can to incent the development of clean coal, both research and technology and either production tax credits or investment tax credits. The western governors, I think would say it is our number one goal as an association.

So again, thank you so much for the opportunity to be here and the opportunity to testify this morning, Mr. Chairman.

[The statement of Governor Ritter follows:]

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Bill Ritter, Jr.
Governor

Bill Ritter, Jr.

Governor of Colorado

Testimony before the House Select Committee on

Energy Independence and Global Warming

September 20, 2007

Chairman Markey and esteemed members, it is my pleasure to appear before you today as you continue your important work in crafting a 21st Century approach to energy in the United States.

While I am here to represent the great state of Colorado, your work is critical to future generations in every state in the union, and indeed to the world at large.

Thank you to Congressman Udall for his kind introduction. In fact, we can look to Congressman Udall's tenure in our State Legislature for the seeds of what I have termed the "New Energy Economy" in Colorado.

While climate change presents our leadership with a tremendous challenge, that challenge is matched by the opportunity of our nation to respond to an evolving energy landscape.

In Colorado, we are embracing that opportunity through incentives and goals that are designed to promote the widespread deployment of renewable energy resources combined with the most cost-effective resource: energy efficiency.

It has been our experience that this opportunity creates new jobs, spurs economic development and increases the tax base all while saving consumers and businesses money and protecting our environment. In 2004, following three years of failed legislative efforts, the people of Colorado placed the nation's first citizen-initiated renewable portfolio standard (RPS), Amendment 37, on the ballot. While the effort was opposed by virtually all Colorado utilities, including the state's largest utility – Xcel Energy – the effort passed by a wide margin. The Colorado RPS established a goal of 10 percent renewable resources by 2015 for Xcel Energy (along with the other Colorado Public Utilities Commission regulated utility, Aquila).

In 2004, 10 percent was an ambitious goal; a little over 1 percent of Xcel's electricity was generated from renewable sources at that time. Today, it is the country's leading provider of wind energy. Xcel will meet the 10 percent by 2015 goal at the end of 2007 – nearly eight years ahead of schedule.

Xcel has done what all successful businesses do – it adapted. While Xcel originally viewed the RPS as a burden, it soon recognized it as an opportunity, and the utility is now a great example of the successes that will come from our New Energy Economy.

In the 2007 legislative session, Xcel joined with my administration to double the RPS established in Amendment 37. Colorado's new standard, signed in March of this year, sets a goal of 20 percent renewable energy by 2020. Furthermore, the new RPS also brings in municipal utilities and our state's rural cooperative utilities to meet a 10 percent goal by 2020. I am proud to say that these coops and municipal utilities supported the legislation passed this year. It is truly a new era for energy in Colorado.

It is imperative to recognize this would not have happened without the leadership of the citizens of Colorado. I believe Colorado's support for the New Energy Economy is driven by a number of factors.

It is partially our historical connection with the land and the environment. In the West, farmers and ranchers understand sustainability and responsibility for the resources they will pass to the next generation.

It is partially a protection of our economic interests. Our agricultural industry and our tourism industry are inextricably linked to climate and weather patterns.

But, it is also our Western spirit of independence and innovation. We believe reliance upon unstable regions of the world for our energy undermines our economic freedom. We believe in our ability to innovate and develop solutions to complex problems. And we have demonstrated our capability to meet those expectations throughout our pioneering history.

In Colorado, we've established policies to increase production of renewable energy resources by both creating incentives and reducing barriers. We exempted our renewable power producers from a sales tax on their capital equipment. This helps the economics of these very capital-intensive industries and maintains cost control on the price of power for the consumer.

Certainly, the most beneficial incentives have come from the federal government – the Production Tax Credit and Investment Tax Credit are key components to attracting large scale investment in renewable technologies. Extending the PTC helps to bring stability to the investment market. But we can also benefit from additional incentives to access low-cost capital, such as tax exempt financing for landowners, and to develop the transmission infrastructure that is necessary to increase the deployment of renewable power across the west.

Furthermore, a renewable energy industry requires an educated workforce. Colorado has been at the center of renewable energy research since the Carter Administration, when the National Renewable Energy Laboratory (NREL) was established in Golden, Colo. NREL has led the world in its groundbreaking research on solar, wind, biofuels and fuel cells.

Recently, NREL joined in partnership with Colorado State University, the University of Colorado and the Colorado School of Mines to form the "Collaboratory," increasing the effectiveness of their individual research efforts while attracting private investment combined with important federal resources.

In 2007, Colorado will have 1,100 megawatts (MW) of wind power on-line. Last week, I cut the ribbon on a new 75MW wind far in rural southeast Colorado. Later this fall, I will be cutting the ribbon on another 300MW plant in Weld County.

Wind power offers affordable, clean energy opportunities that address two significant agricultural concerns in the West: water and weather. Large scale wind energy production in Colorado occurs in regions of our state that rely on the vagaries of the agricultural economy. These communities operate on the economic margins.

When a wind development company comes into the area and develops 400 MW of wind power, as occurred this year in Logan County, that county benefits from the direct jobs, the indirect economic impact on local businesses and service providers, as well as the more than $2.5 million of annual property tax revenue to the county. Additionally, the revenue to the agricultural operator providing the land can temper the ups and downs of an industry that is profoundly vulnerable to changes in weather conditions.

Mark Twain said, "Everyone complains about the weather, but no one does anything about it." We're not satisfied with that approach. Our agricultural communities need a backstop to ease the impact of drought on our wheat crops and snow on our cattle ranchers. Renewable energy can provide that backstop.

Furthermore, as we are now seeing around the world, if this Congress presents strong policies on global warming for the country, such as the national RPS, you could actually change the weather.

In the Southwest, where anticipated climactic impacts include drought, heat and decreased snowpack, we'd appreciate that.

Renewable energy development of the future is not limited to wind. In Colorado, we are fortunate to have a broad mix of renewable resources, including wind on our Eastern Plains, solar in the San Luis Valley and southwest part of the state, and geothermal all along our Western Slope.

In the San Luis Valley, we had a groundbreaking this year for one of the nation's largest solar photovoltaic plants. In Colorado, our RPS has a unique component – a "solar carve-out" that requires 4 percent of renewable resources to come from distributed and industrial-scale solar facilities.

This requirement has spurred a growth in the solar industry, from solar installers to the manufacturing of solar panels to technological advances that will transform the face of solar energy in the future. It also provides rebates that have driven more than 5 MW of solar to be installed on homes and businesses throughout Colorado in just under three years.

Under our recently passed legislation, more than 80 MW of solar power will be installed by 2020. Increased rebates for distributed solar at the federal level will further enhance citizen investment in this renewable technology. Solar is not only clean power, but it provides energy at times when we experience peak load demand without requiring additional investment in transmission infrastructure.

In solar energy, as with much of the New Energy Economy, so much of our future prosperity is being developed in the laboratory. In Colorado, AVA Solar just announced it will develop a large scale production facility for its cutting-edge, thin-film solar technology. AVA is scheduled to have available in 2009 solar panels that produce electricity at $1/watt – one quarter the cost of currently available technology.

Primestar Solar, another Colorado-based company, is developing thin-film technology and just received $76 million from the U.S. Department of Energy to advance its efforts. Ascent Solar, also from Colorado, has developed a laser-based, thin-film production method. This will allow the company to greatly expand the potential of a variety of next generation applications, from integration in building materials, to vehicles, to personal applications.

Another exciting development on the horizon is concentrated solar power (CSP). The capacity to develop industrial scale solar energy that can be stored and dispatched to the grid is an opportunity for this nation to embrace. In Colorado, our San Luis Valley offers some of the highest solar potential for the deployment of concentrated solar production. In addition to the energy development, the economic opportunity associated with these facilities is of great interest to Colorado.

Any discussion of electrical production needs to include more efficient use of our resources. Buildings in the United States account for 76 percent of electrical energy usage. Simply increasing the efficiency of these buildings lowers our overall energy burden and saves the consumer money.

In Colorado, we have employed a strategy called "performance contracting" on our state buildings. Performance contracting uses the financial benefits of a lower energy demand to finance upfront capital investments in efficiency. Just recently, we installed a 10kw solar PV system on the Governor's Residence. The entire system was financed using the savings we gained by making our state Capitol more efficient. As a bonus, we received a $38,000 check from the utility as a rebate on our investment in solar technology.

When addressing our reliance on foreign oil, we are looking primarily to transportation fuel and heating alternatives. This year, my administration will quadruple the number of bio-fuel stations in Colorado. That is just the beginning. We are working with communities, producers and private industry to increase the feedstocks and use of bio-fuels.

We need the federal government to invest in a focused effort to expand our alternatives. We need additional research investment and production incentives for solar thermal and geothermal systems to offset reliance on fossil based heating sources. Biomass development of fuels from waste streams in the agricultural and municipal sectors and feedstocks for the widespread development of bio-diesel and alternatives to traditional corn based ethanol are also areas in which the federal government can reduce our reliance on foreign oil.

Colorado is the home of Range Fuels, which is developing the nation's first cellulosic ethanol plant in Georgia. We need more opportunities for these kinds of cutting edge technological developments to free us from the chains of foreign oil. The federal government can play a pivotal role as we embrace these opportunities.

The transportation fuels of the future may be provided partially from our electrical grid. My administration owns a plug-in hybrid that averages nearly 100 mpg. We have a company in Boulder, Colorado, which retrofits hybrid cars to make them plug-in hybrids, doubling their efficiency. But that's not market transformation. The technology is here today, it's just not accessible to most people under the current market conditions. The citizens are looking to the federal government to advance these important opportunities.

Our traditional sources of electrical generation in Colorado – primarily coal – are major contributors to climate change. But we can't simply abandon that economic sector. We need to develop technologies like IGCC and carbon capture and sequestration so we can produce power from our existing natural resources without the accompanying carbon emissions. The federal government plays a key role in helping us achieve that goal through research and implementation assistance.

I applaud the members of this select committee as well as members such as Congressman Udall for the recently passed energy bill that recognizes these imperatives of the New Energy Economy. The National RPS that was included in the energy bill in the House represents a unified front for the nation and a statement that we are all a part of this solution.

The committee has asked how a national Renewable Electricity Standard will impact technologies in Colorado. Developments in wind technology have led the industry to be cost competitive with fossil fuel generation, but we need similar developments in both solar electric as well as concentrated solar technology. With the appropriate leadership from the federal government, these resources have the opportunity to join wind as a primary source of renewable power.

We have a largely untapped baseload energy resource below the surface of our region: Idaho Springs, Steamboat Springs, Glenwood Springs, Pagosa Springs … these Colorado towns got their name for a reason. Geothermal energy can provide constant and reliable energy for the nation – but the technology has to become cost competitive for widespread deployment. Again, this is an important role for the federal government to take.

A national electricity standard will provide the impetus for broad scale transmission development. We have evidence that the larger the renewable network, the more reliable the power. If you look at the wind production data, the wind power in the southeast Wyoming complements wind production in southeast Colorado – producing power at different times of the day. To create a large network of renewable resources, we need a large network of integrated transmission capable of managing these resources. We need a "Smart Grid."

In Colorado, we created the Clean Energy Development Authority to help finance renewable transmission projects. We're joining with the Wyoming Infrastructure Authority and the New Mexico Renewable Energy Transmission Authority to examine ways to further the building of regional transmission systems for renewable energy.

The federal government can provide access to tax exempt bonds and other incentives for the widespread build-out of renewable transmission to assist states in contributing to a national renewable electricity goal.

Colorado recently joined a consortium of other Western states and a few Canadian provinces to examine a cap and trade system, to let market forces guide the deployment of carbon reducing technologies. We are currently participating as official observers in this process. Frankly, this is a role for the federal government. Rather than a patchwork of disjointed trading schemes, the country should have one unified trading market that can participate on the world stage. In so many areas, we have seen the United States isolate itself from international cooperative efforts – a cap and trade system for the carbon market would allow our country's innovative efforts compete in international markets while reducing global levels of greenhouse gases.

As we saw with the RPS in Colorado – we encouraged the market through the RPS, and the market has responded. Investment, research and development are following the establishment of the RPS. A federal RPS provides more markets for renewable energy, prosperity for Americans in the heartland and a more responsible energy future for our nation.

Recently, the world's leading supplier of wind turbines – Vestas – chose Colorado for its first North American manufacturing facility. When I met with the principals of Vestas in February, they were looking at many advantages of locating in Colorado, but of great interest was the legislation to double the RPS and my administration's commitment to renewable energy. Their confidence in that commitment brought nearly 500 manufacturing jobs to Windsor, Colorado and, we believe, the bell-cow of a renewable energy manufacturing industry.

The federal government stands at a similar point on the world's stage. The opportunities of the New Energy Economy are open not only to Coloradans, but to the Western spirit that lives inside all Americans.

In Colorado and throughout the West, we don't blindly accept conventional wisdom; we challenge assumptions and we work hard. While our citizens are uniquely cut from the Western cloth, I believe they also represent what is best about America.

Your leadership is appreciated at this critical juncture in our nation's history.

The CHAIRMAN. Great. Thank you, Governor, so much for being here.

Now to the Members, I think in order to accommodate everyone, what we'll do is we'll go to a round of three minute questioning, because the Governor does have to leave by ten o'clock. And if there is time left over, we will just keep revolving around the Committee Members with perhaps even a shorter period of time so that everyone can have an opportunity. So the Chair will recognize himself now for a round of three minutes of questions.

Let me ask you, Governor, about your electricity rates in the State of Colorado. How has this move to 10 percent renewable electricity affected the rates for your consumers?

Governor RITTER. I think there's been statements by our regulated utility that actually the rates have either—the cost of producing electricity has either been brought down by a renewable portfolio standard or remained relatively the same. We know that there is a difference between the rate at which you can buy a kilowatt hour for coal and there's a difference between that and something like let's say solar.

We see the price of solar coming down as the technology gets better. Our conversations with people who are involved in solar would say that it's coming down pretty significantly. We understand that as it relates to coal, if we go to gasification or if we find technology that can strip off CO_2 at scale at the altitude that we have, with the type of coal that we have, that that's going to likely increase the price of coal and we'll be competitive with solar, but as it stands, particularly with respect to wind, wind, natural gas, and coal, are there in a place where they're competitive and it has not impacted the rates that our consumers are paying. And again, the PUC looks at this. They pay attention to this and it was something that we very much have paid attention to as we move through this renewable portfolio standard.

The CHAIRMAN. Now with regard to the rural parts of Colorado, could you talk about the impact that this new momentum is having and could have on rural Colorado?

Governor RITTER. Well, Florida Power and Light is building one of the largest wind farms in the northeast part of the state, which is part of an opening, a ribbon-cutting last week where we put 75 megawatts on line that will produce energy for 220,000 homes. We already had 108 turbines on land just east of that. British Petroleum is building one wind farm and has talked about additional wind farms and each time they do that imagine if a farmer—there's a place in the Southeast part of the state, 108 turbines. They only have 68 acres out of production. They can make a choice between either taking a per turbine lease where they are paid by the turbine, or they can decide that they take a percentage of the electricity produced and the cost that——

The CHAIRMAN. If they take a per turbine lease, do you know what the average farmer or rancher receives in compensation?

Governor RITTER. It's my sense it's somewhere around four to five thousand. And actually, we're joined by some Coloradans here, one of whom has eight turbines on his land. We just talked about that. The newest contracts now are giving you the alternative of one or the other, and I think maybe it's either $3,500 or the cost

of the, or the percentage of the electricity that's generated and the price that they're earning for that. It's one of the two. And so, it is still significant. I mean, I know there is a farmer that's getting a $4,000 per lease turbine and, you know, if you have 100 turbines on your land and you only have 68 acres out of production, it doesn't take long to do the math and understand what value you are adding not just to that farmer, but to these counties and to their tax base and that's very significant for us as a state.

Governor RITTER. My time has expired. I recognize the gentleman from Wisconsin.

Mr. SENSENBRENNER. Thank you, Governor. I am curious about the transmission lines siting issues because very frequently the places that are best for renewable energies, particularly solar and wind are not where the people are. And I have noticed that the wind resources appear to be in eastern Colorado. The solar resources occur, appear to be in southwestern and south central Colorado. I have found in Wisconsin that people don't like transmission lines, you know, running through their property. How do you plan to deal with that?

Governor RITTER. Thank you, Mr. Sensenbrenner. There's a couple of issues. One was just the availability of transmission, because we had always been told, and especially during the campaign when I was running because we made renewable energy a big thing. They said, you know, an impediment is even building the transmission. We went to the REAs and we said to them, the Rural Electric Associations, what does it take. They said we really need to have bonding capacity to borrow against this, and we believe that there's this ability on our part to build out the transmission if in fact we can get the bonding capacity.

When I just did this ribbon cutting in the Southeast part of the state last week, there are about 12 farmers who are involved either in having the turbines or in having some part of the transmission lines on their property. Basically, the farmers in the eastern plains understand the value to the economy of this and in siting for transmission to date has not been a problem.

There was a meeting in the Southeast, the southern east most county. It is called Baca County. It's a very small, not a terribly big, well-populated county, and 65 farmers showed up because they want to understand how they can be a part of this. So it has not been a problem for us. I do appreciate the point. In the west, we've always had this issue. There are transmission lines that run across some places that are otherwise not inhabited. And so we had that experience, but we I think also understand that with this renewable energy economy comes the need on our part to provide the transmission.

We're talking to other states about a regional transmission grid that we think has to be part of our thinking here. But again to date, siting wasn't the problem. It was thinking about how we pay for it going forward and we did two different things that will help us build out transmission.

Mr. SENSENBRENNER. I have one further question relating to traditional energy. Xcel Energy is proposing a coal-fired plant that uses some pretty significant technology that reduces CO_2 emissions and sequesters a lot of the other ones. Do you support these tech-

nologies and would you support streamlining the permitting process for those who wish to build this plant?

Governor RITTER. Well, I certainly support the technology. I mean, everybody that we speak to around issues of climate change will say, and we've had several meetings about this. I just met with the Governors of Wyoming, Utah, and West Virginia, actually as coal producing states, to talk about where we are with respect to the technology and what we need from the federal government in either production tax credits or investment tax credits.

I very much support our going forward with research and development and providing incentives for not just the research and development, for building the projects to scale where the technology is proven, both is gassification and stripping off the CO_2. So I believe it is something that has to be a part of our energy portfolio as we go forward, and I would very much support the technology.

As it relates to the permitting process, you know, as long as those things that I think are still the responsibility of government, air quality, water quality, and even with us a fair amount of other issues around land use as long as those things are still part of the process and thought about carefully, I would support us being able to do that in a quicker fashion.

The CHAIRMAN. The gentleman's time has expired. The chair recognized the gentleman from Oregon, Mr. Blumenauer.

Mr. BLUMENAUER. Thank you, Mr. Chairman, and I will try to atone for jumping the gun here by being short with just one question.

Governor, you may have heard that I am very interested in having the federal government be a partner with you by having sound, consistent stable policies over time. I'm wondering if you have any comment on the impact of if we're successful in establishing a renewable portfolio standard nationally, even if lower than your 20 by '20, how that would impact your efforts to evolve your new energy technologies in Colorado. Does that help or would that hinder your efforts?

Governor RITTER. It is my understanding that any federal RPS would take into account what states are doing as well, already doing. I have to think that it can only help and here is why: states are begging for involvement by the federal government to have some kind of a consistent and coherent national policy that looks at conservation, looks at efficiency, looks at renewable, looks at clean coal, looks at what the portfolio is going to be like going forward, but has us really speaking with one mind and one voice.

We've got people from, the Prime Minister of Sweden visited, Governor Schwarzenegger, visited Colorado, visited me, to talk about what we as a state are trying to do in moving forward. I think, you know, as we talk about climate change and the issues around climate change that we are best as a country when we speak with one voice around something that has such an over-arching, an over-arching impact on the rest of the world.

So I think as it relates to an RPS that's just one part of the conversation, but it is terribly helpful in having the broad conversation as a country with the rest of the world.

Mr. BLUMENAUER. Thank you, and I yield back.

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

Ms. BLACKBURN. Thank you, Mr. Chairman. Governor, thank you for being here and following on with what Mr. Blumenauer said, states like mine, Tennessee, are not, when you look at a renewable energy portfolio and requirements for different states, mine are not good areas for wind and solar. You've referenced the Governors Association and the meetings that you all and the conversations that you have there. I think we would all be interested in what you would see as how to have flexibility within some requirements and within that portfolio.

And I would just like to, Mr. Chairman, ask for the record that those recommendations be given to us so that we could see what you all, you've referenced some of yours and some of your benchmarks.

I think as we look at applications to the federal level, we would enjoy hearing from you to move forward in front of the Governors Association.

Governor RITTER. Actually, thank you very much and I think you will see the National Governors Association is making energy and energy issues going forward the issue for us to discuss this coming year and Governor Pawlenty from Minnesota is our chair and has decided that his initiative will be about around our energy future and so it is a very helpful discussion to have, all the governors in the room and talk about what we as a country can do, state by state by state. The western governors, Democrats and Republicans alike very much share a view about how we as producing states and consuming states can really, we think, make a difference with this federal conversation by talking about this wide portfolio that we should be thinking about and really, I think, looking for assistance where research and development is concerned regarding clean coal.

Ms. BLACKBURN. Great. Let me move on in that vein. I want to talk a little bit about the reaction of the public and in some of the reading we've done with what you've done, you've promoted the establishment of E85 stations in your state. I want you to talk for just a minute about the infrastructure and if you plan to use pipeline or if you're going to use fuel tankers, which I would imagine is what you're going to do for that distribution and then how that would affect your interstate shipping and road congestion.

And then also with the production of ethanol in your state, as you're looking at that, water resources. We continue to hear about the impact on water resources and drought conditions and what the impact would be on your corn production and not only that, but access to water and water bills.

You know, as we look at constituents and how they are impacted by policy, so many times and even in Tennessee, in my area, we've had a serious drought this year and we have seen the impact of availability of water, access to water, and then the uptake in the bills and I would be interested in how you were going to address that. And I yield back.

The CHAIRMAN. The gentlelady's time has expired. If the witness would please respond.

Governor RITTER. Thank you, Mr. Chairman. As it relates to E85, we have I think 13 pumps or we had at the beginning of this year. GM, General Motors, came in with us. We made an agreement to quadruple the number of E85 pumps. So that's a corn-based ethanol. What I'll tell you is this. We have significant research happening in Colorado. Colorado School of Mines, Colorado State University, and the University of Colorado formed a collaboratory. We did and the state government formed a collaboratory with the National Renewable Energy Laboratory.

I think if you talk to the researchers, most of them would agree that while it is important for us to focus on E85 and corn-based ethanol as a transition, it is not necessarily the fuel of the future. It's not the biofuel of the future, that there is a great deal of research going on with respect to other kinds of biofuels that may well be the new energy economy's fuel.

However, it is important that we have this idea about this transition fuel, this corn-based ethanol, so the public begins to become aware of it so that automobile manufacturers begin to respond to it. And whether it is a hybrid car or whether it is some type of biofuel, we will see. But we know right now that corn ethanol is giving us this ability to think about it in terms of transmission. We just opened a biodiesel plant made purely from sunflower oil in the southwestern part of our state. Again, a great economic development for that little county.

Water is an issue in Colorado. We're in an arid state. We're at the seventh year of a seven year drought, so we very much pay attention to it and I think that's why some of the research that's happening as well at those universities and at the collaboratory involves drought-resistant kinds of crops. Cellulosic ethanol is what a lot of people talk about as part of the future, but we're very mindful that these kinds of policies do have impact. They have impact on corn prices, which in turn have impact on beef prices and we're a cattle producing state, so we're watching this all very carefully, understanding that this is not a place where you do pick winners and losers.

We're very much trying to put in place policies that are science and technology neutral, but that still inspire us to do what we need to do as a country to move in that direction around just a biofuel that I think responds to the concerns that you address.

The CHAIRMAN. Thank you, Governor. The gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you. First, I want to thank you for your leadership in Colorado. Thanks for sending us Mr. Udall. He has done a great job for us federally, and we follow Colorado with the second RPS by popular vote and we sort of stole the playbook from you and we appreciate your efforts on that.

I want to ask you about feed-in tariffs as an adjunct to renewable portfolio. I've been talking with some folks who suggested that having a program where you a pay a given amount for the amount of energy that is produced from solar or wind has some advantages compared to renewable portfolio standard for next generation technologies. I've heard some people suggest that a renewable portfolio standard is really good for sort of the next technology, but really

not maybe so good for the second, third, or fourth. They may be just a little behind as far as the cost of development.

Do you have any thoughts about that? Some people suggested that we ought to look at a feed-in tariff as well to help some of those second, third, and fourth generation technologies coming on.

Governor RITTER. Mostly, this in my conversations with wind producers, where the technologies have actually gotten much better. We are in that next generation of wind production right now and we're experiencing that in Colorado with the change in the size of the blades and I think the way the turbines are working and that happened without a feed-in tariff.

Likewise, as it relates to solar, we're talking to people, the solar producers, about concentrated solar power and that being sort of the next generation of solar technology. I myself think of feed-in tariffs this way, that if they happen, they have to happen at this level, at the federal level, that you have to think about it and you really have to develop an understanding that as a state, you put yourself in a real hole if you try and do it state by state by state, same really, in some respects, with other kinds of issues that impact this carbon trading as one of those issues that is hard to do even region by region but might be workable.

But respect to fees and tariff, we have not, I have not seen how they would incentivize differently than what is already happening, these renewable portfolio standards.

Mr. INSLEE. Right, I appreciate that. By the way, we're really, at least I'm very excited about solar thermal. You know, we've seen there's going to be some announcements next week actually about some solar thermal contracts that are going to blow people away. I think it would be very exciting for us and I will crow about your success and the second version is getting to write a book about clean energy called Apollo's Fire.

You didn't get in, but in the sequel, I want to make sure you get in it, because of your success. Thanks for your leadership.

Governor RITTER. I appreciate the hopeful mention.

Mr. INSLEE. Yes.

The CHAIRMAN. The gentleman's time has expired. The Chair recognizes the gentleman from Oregon, Mr. Walden.

Mr. WALDEN. Good morning. Thank you, Mr. Chairman. I want to pursue the issue of geothermal. I represent eastern Oregon, about 70,000 square miles and I was down at Oregon Institute of Technology recently and was told by some folks there and elsewhere that up to two-thirds of Oregon's electric energy production could come from geothermal sources given that now there's technology, you can produce electricity at 163 degree water.

And I'm just curious about how we pursue that geothermal and your views on this because a lot of those resources reside on public lands, as you know. I don't have to tell you in the West or half of my state is under public ownership and it's very, very restrictive to get in there. And yet, some of those resources may hold great promise for us to have a very carbon neutral or carbon offsetting potential for electricity.

Do you encounter those problems in Colorado and if so, what advice could you give this Congress in terms of accessing those resources?

Governor RITTER. The State of Colorado, we believe, has the fourth best potential for geothermal of the 50 states and so I don't know where we fall.

Mr. WALDEN. It's got to be below Oregon. It just has to be. [Laughter.]

Governor RITTER. Well, if you think about it Steamboat Springs, Glenwood Springs, all those big cities we named after springs we did for a reason because we have such great geothermal potential. And so, it's like many other things we ask how do we incentivize the building out of that, because as far as I know geothermal is not something that we have tapped nearly like we've begun to tap wind and even solar and something we intend to do.

We're looking at the possibility of supplying power to our Governor's residence with geothermal because the technology is there and it is easy enough to tap. The question is how will we do it on public lands and I think that that has to be again decisions made back here. We have 23 million acres of land in Colorado and would very much enjoy, I think, a federal policy that incentivizes it the way that we've incentivized wind power through the investment tax change.

I concur, because I think it can be clean energy. I think it can be done in an environmentally appropriate way. The question is can we get through the hurdles that are in front of us and every other sort of energy development or use on federal land. The final question I'd have involves this issue of biomass and I know having chaired the Forestry Subcommittee, my friend and colleague from Colorado, Mr. Udall, is involved in forestry issues. Don't you face some severe forest health issues, part of which may be driven by increased temperature which bring about drought and changed structures? And don't you think the federal government should be doing more to allow us to get in on the different forests and thin them out quicker and replant and restore after fires and use the biomass for energy production?

Mr. WALDEN. Yes. We really have a serious pine beetle infestation.

Governor RITTER. Yes, I know you do.

Mr. WALDEN. Problem in Colorado, very serious, log pole pine, they're all about 80 years old and that increased sort of the infection rate from tree to tree to tree. As a result, we have entire forests that are damaged and infected. And the fire damage is elevated slightly right now, the needles have turned red, but as those trees fall over in the next 15 to 20 years, the fire danger is very much exaggerated and so I've spoken with U.S. Forest Department, I've spoken with Mark Ray, the Chief of the Forest Service and asked them this question, this very question, how can we begin to clear that land and reduce the fire danger over time and use the wood for woody biomass to generate electricity.

Governor RITTER. I had some legislation last session that we could have gotten that done if we could have gotten it through the Senate. Thank you.

Mr. WALDEN. Great minds think alike here.

The CHAIRMAN. The gentleman from Missouri, Mr. Cleaver.

Mr. CLEAVER. Thank you, Mr. Chairman. Thank you, Mr. Udall for all your work, and Governor, thank you for being here.

I just have one question and I'm from Missouri and we do have RPS put in place voluntarily and it's 11 percent by 2020. What chances do you think we have of meeting those goals voluntarily? I mean I think the effort put in to establishing this was good. People were genuinely interested in trying to make some dramatic changes in the way we handle electricity. But a voluntary program does not appear, based on what's happening so far to have the same amount of juice that a government-mandated program would have. So am I off? What do you say based on what's happening in Colorado?

Governor RITTER. Thank you, Mr. Cleaver, and I would have to say that our mandate that was voter passed really showed that the leadership was coming from the people, but they wanted a mandate. They wanted the utilities to have to do this and that was three years ago. It was 10 percent by 2015. I suspect if we had said voluntarily we would like you to get there, that the result would be different than us looking at that 10 percent by the end of this year and achieving that goal.

I'm not a person who thinks that across-the-board mandates are the right thing, but this is too important a conversation for us to not undertake and undertake now because of what we face if we don't make the right, I think, transition to clean energy and to renewable technologies and conservation and efficiency and that's really—part of my point is it's part of this other bigger conversation. But some of it has to come through mandates I think to force the conversation, but then what we found were our biggest opponents became our biggest allies when they understood the benefits of getting there.

I appreciate it and just a moment of privilege, I met Representative Cleaver when he was the Mayor of Kansas City. He came to Denver and I was a District Attorney and he was a wonderful and gifted speaker and helped us in many respects form some public policy around responding to violence and it's just great to see you again, Mr. Representative, thank you.

Thank you, Mr. Chairman, for allowing me that point of privilege.

The CHAIRMAN. The gentleman's time has expired. The gentleman from California, Mr. McNerney.

Mr. MCNERNEY. Thank you, Mr. Chairman. Thank you for coming to see us this morning, Governor. I want to echo some comments I've already heard. California has adopted renewable portfolio standards and the utility companies resisted it at first and we found that once they got on board, they met the goals early and we're having to increase our performance standards numbers and they're willing to go out after those so it's very common to see that sort of behavior.

I want to thank Mr. Walden for bringing up the comment about geothermal energy. It's very effective for some states like Colorado, so whatever we can do to help that.

I have a couple of questions. How large an impact has the sales tax exemption on both the production of renewable energy and on the state revenues?

Governor RITTER. The sales tax exemption, Mr. McNerney, was just passed in this last session. Actually, there were some power

purchase agreements where they believe that it was in place and there was some question about whether it was or was not. It has been a big impact in having, I think, wind companies decide to build there going forward because they really believe that it can impact the margin sufficiently enough that this does become again, remain competitive with natural gas and coal. So it was, it has had a big impact on decisions.

We've met with the companies. With the companies that are making decisions. Florida Power and Light, I think may well have made a decision and went the other way, had we decided not to put in place that sales tax exemption in law.

Mr. MCNERNEY. But you don't have an idea of how that's going to impact the state revenues?

Governor RITTER. Well, no. Not until it's all said and done, but what I can tell you so Florida Power and Light is putting in, we think it's the second biggest wind farm in America and 300 and some turbines and if we go back to the price that these farmers earn, the difference it makes, and even what we think may be the production that will happen at the wind blade manufacturing company in Colorado was a result of that, all of those things add just so significantly to the economic activity around that, that it's significant.

Mr. MCNERNEY. Does Colorado have its own production tax credits and investment tax credits, state-wide?

Governor RITTER. It's just the sales tax exemption for the manufacturing of equipment that's used to produce renewables. That's what we have, sir.

Mr. MCNERNEY. In the time remaining, could you describe how the performance contracting works on state buildings?

Governor RITTER. Again, the answer is yes, and it's new. I can answer how it works, but it's very new for us and we passed performance contracting on state buildings and I signed an executive order that's a greening of government executive order and we will look to the build-out of buildings that create energy efficiencies, that create energy conservation as a part of it, that meet certain leads standard and we hope at the end of the day a leads gold standard for all new state buildings and that that will all be part of the performance contract that goes on going forward as a result of our executive order and the legislation that we passed around that.

Mr. MCNERNEY. Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired. Governor, could you just, as you leave, give us your advice to the other states. Give us your advice to the other Governors to the other utilities like your utility that initially was hesitant to embrace this new vision and this whole concept of NIMY or BANANAs, build absolutely nothing anywhere near anybody, what has happened in your state, what recommendation do you have to other states and utilities in other states?

Governor RITTER. We're a state for a lot of reasons that's very sensitive to climate change. We have two of our three biggest industries, tourism and agriculture, that are both very closely tied to not just the amount of water that we see or the amount of rainfall, but really the kind of rainfall. I mean, it matters that the precipita-

tion is snow instead of rain in the mountains. And even as it relates to our agricultural industry, we are very, very sensitive to rainfall.

And so, I think that may be one of the reasons that in Colorado, a state like Colorado, in the last two years, we've seen a 20 point shift in how people think about climate change. And that has produced in our state the ability to have this really serious conversation about our energy future, both as it relates to our production but also as it relates to consumption. When we think about our kids and our grandkids and we ask the question what is it going to be for them in 25 or 30 years if we don't make decisions today about our energy future.

And so that is, I think, providing the impetus for our initial Amendment 37 and then the ease with which really in many respects the ease in that it was just not great resistance from the corners you might have expected the resistance to come from. So I think it is important to have the conversation about a renewable portfolio in the context of this larger conversation about climate change and really about global warming and about our responsibility as citizens of the state or of the country in doing something to address it.

And then to say what are the possibilities in this state and to have a conversation that looks and borrows experiences from other states. But every region in this country has some level of renewable energy. Regional transmission grids for those states that are concerned about their lack of renewables we think a regional transmission grid is absolutely something that we must think about in order to respond to the needs of those states that feel they don't have sufficient renewables to have a portfolio in place like we do in Colorado. But I think the most important thing is that we need to do it and we have to do it as a part of larger efforts around efficiencies, conservation, and clean coal investments, and using natural gas as well. It burns less carbons. All that has to be a part of our going forward, but if we miss the opportunity around renewables, we really miss a significant opportunity to make a difference on the environment and I think have a real—miss the opportunity for us as a country to do something that can really move us towards energy independence at a quicker rate.

The CHAIRMAN. Thank you, Governor. Congressman John Hall from the State of New York has just arrived. We promised the Governor he'd be out of here in two more minutes.

Do you have a question you'd like to pose to him in that two-minute period?

Mr. HALL. No, thank you. Just thank you for the work that you do and for being here. And I'm sorry I'm late.

The CHAIRMAN. Governor, your testimony was incredibly impressive and the state, your leadership, Mark Udall's leadership, it's a real beacon for our country and a standard that I think we should see for ourselves as a nation as well. We thank you for being here today.

Governor RITTER. Thank you, Mr. Chairman, and I appreciate that.

The CHAIRMAN. Thank you, Mark. Now what we agreed at 9 o'clock was that any Member who wished to make an opening

statement at this time would be recognized for that purpose. I look to the majority side and look for anyone who might seek recognition for that purpose.

The gentleman from New York.

Mr. HALL. Thank you, Mr. Chairman. I would just briefly open by saying that to combat global warming it's clear that in addition to dealing with what comes out of our tailpipes, we must also address the pollution from our power plants. The environmental logic of converting from relying on fossil fuels to climate-friendly renewables is clear and compelling. I'm proud that my State of New York has been a leader in this transformation adopting a 25 percent renewable standard by 2013.

I'm extraordinarily eager for Congress to follow suit by adopting the House passed RES and sending it to the President who I hope will have the good sense to sign it into law.

I would like to focus my questions today on breaking down the false choice between growth and green that some opponents of Renewable Energy Standard have tried to put forward and I yield back the rest of my time.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired. Will the gentlelady like to make an opening statement, the gentleman from California? Would the gentleman from Oregon like to reclaim the balance of his time?

Well, then we'll turn to our second panel and it is a very distinguished panel. And we will ask each of them to make an opening statement of five minutes and then we'll turn to the Members of the Select Committee to ask questions of them.

Our first witness is Nancy Floyd. Congressman Bluemenauer has already referred to her incredible résumé. She is the founder and managing director of Nth Power. Nth Power was one of the pioneering clean tech venture capital firms and now has $400 million under management. As an active member under E2 environmental entrepreneurs, Ms. Floyd works to promote environmentally-minded, economic development. In the 1980s, Ms. Floyd also founded one our country's first wind-development firms. We welcome you, whenever you're ready, please begin.

STATEMENT OF NANCY FLOYD, FOUNDER AND MANAGING DIRECTOR OF NTH POWER; ACCOMPANIED BY MIKE SLOAN, MANAGING CONSULTANT, THE WIND COALITION; CHRIS HOBSON, SENIOR VICE PRESIDENT, RESEARCH AND ENVIRONMENTAL AFFAIRS, SOUTHERN COMPANY; BOB REEDY, DIRECTOR, SOLAR ENERGY DIVISION, FLORIDA SOLAR ENERGY CENTER; AND DAVE FOSTER, EXECUTIVE DIRECTOR, BLUE GREEN ALLIANCE, UNITED STEELWORKERS

STATEMENT OF NANCY FLOYD

Ms. FLOYD. Great. Thank you very much. It's a pleasure to be here, Mr. Chairman, and esteemed Members of the Committee.

I've been asked in my five minutes to address the current investment environment for renewables and what the passage, what a national Renewable Energy Standard, how that would impact the investment community. And so I have four key points to make.

The first is that renewable energy markets are growing explosively. The global market last year grew 39 percent, so the market was $55 billion. And that growth is akin to the growth of the PC, the wireless and the internet industries during their heydey. And the industry is projected to quadruple in the next ten years to $226 billion. And this has really been driven by a convergence of market factors, kind of a perfect storm: resource depletion, aging infrastructure, energy security and global warming.

And the venture capital community and the investment community at large is responding to this opportunity. So ten years ago when I made my first venture capital investment in this sector, less than $50 million was being invested in new energy technology companies. Last year, $2.4 billion of venture capital, so one out of every ten dollars was invested in clean energy. And that number is not slowing down.

So it's no wonder that clean energy is being touted as the growth industry of the 21st century. So in the face of this growth, the U.S., I'm sad to say is losing jobs in investment capital to other countries. Of the top wind companies globally only one is headquartered in the U.S., and that is G.E. Of the top solar companies in the world, not one is headquartered in the U.S. And I guess to add salt to wound, of the U.S. solar companies that have gone public recently, all of them are building manufacturing facilities outside the country.

And a case in point is one of my portfolio companies, Evergreen Solar in Westborough, Massachusetts. Evergreen Solar took advanced solar technology out of MIT. They built their pilot production outside of Boston. And then in response to market demand, they wanted to build a manufacturing plant that was going to quadruple their output and they wanted to locate it next to the market. That was Germany, not the U.S. And I know that everybody on this Committee would like to see that Evergreen Solar's next major expansion is in this country so the jobs stay in this country and that we can increase the energy security of this country.

So a national Renewable Electricity Standard would help make that happen because it would create a stable market in this country for Evergreen Solar's products.

I think it's widely recognized that a Renewable Electricity Standard is a fundamental market-making policy that is going to drive innovation. It's going to create jobs. It is going to create and attract investment capital and then there's a multiplier effect here. It's not just venture capital investment, but alongside venture capital in new energy technologies, you have the business expansion capital, you have the investment in manufacturing and in renewable energy projects. And I can tell you that those dollars are on an order of magnitude greater than the $2.4 billion of venture capital that was invested in technology last year.

So how have state Renewable Electricity Standards impacted jobs and investment capital? And I'm going to cite some statistics from my part of the world which is California and the Pacific Northwest. In all three states, California, Washington, and Oregon have passed Renewable Electricity Standards. Oregon, in the last legislative session, so just this past summer. Two years ago when

I testified in front of the California State Legislature, I predicted that there would be $11 billion invested in renewable energy companies and projects by 2010. And I was wrong. More than $11 billion was invested in the two years since that Renewable Electricity Standard was passed and 50 percent of that capital was invested in California-based companies and projects.

Last year, following the passage of the Renewable Electricity Standard in Washington State, Washington became the second state, second largest state in terms of new wind development, adding almost a thousand megawatts of new wind which represented about $1.4 billion of capital investment. But you know, the industry is not just growing on the West Coast, it's growing nationally. Yes, 60 percent of my firm's portfolio are investments that are on the West Coast, but the rest of our portfolio is spread among 13 other states.

And let me take Mississippi as an example. I have an investment in Jackson, Mississippi, I'm on the board, so I spend a fair amount of time in the state and I'm well aware of the concerns of the unequal distribution of renewable resource in this country. And we've heard the South doesn't have a lot of resource in terms of wind resource, but they've got a lot of biomass. A national Renewable Electricity Standard could jumpstart a biopower industry in the South or maybe an energy efficiency industry because the South is the least energy efficient region of the country on a per capita electricity usage basis.

And the EIA is——

The CHAIRMAN. If you could please summarize.

Ms. FLOYD. Yes, okay. Thank you. Renewal energy, it's big business. Serious companies. Series investors. We can lead this growth sector. We have a chance to show leadership and the investment community will step up. Thank you.

[The statement of Ms. Floyd follows:]

Testimony Remarks

Nancy Floyd
Founder and Managing Director
Nth Power LLC
San Francisco, CA and Portland, OR

Renewable Electricity Standards: Lighting the Way
Select Committee on
Energy Independence and Global Warming
U.S. House of Representatives

September 20, 2007

Introduction – Representing Nth Power, E2

Mr. Chairman and esteemed members of this committee, thank you for the opportunity to share my views on a national renewable energy standard. My name is Nancy Floyd. I am Founder and Managing Director of Nth Power, the world's first venture capital firm to specialize in new energy technologies. We started in 1993, and now have $400M under management, with offices in San Francisco, CA, and Portland, OR. We have invested in 42 start-up companies including the market leaders in renewable energy, clean transportation, energy intelligence and smart grid. Our investors include a number of the world's leading energy/environmental organizations, and largest institutional investors who see the need for and the potential financial rewards of clean technology.

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Also, by way of background, in the early 80's, I was the Founder and CEO of one of the first wind development companies in the country, building over $30M of wind projects in Northern California. I am speaking today not just as an entrepreneur and investor, but also as an active member of E2 and as an advisory board member of ACORE.

Environment and Economy linked

E2 or Environmental Entrepreneurs is a national, non-partisan organization of business leaders who believe that a strong economy goes hand in hand with strong environmental protection. E2 advocates at all levels of government, local, state and federal, for policies that encourage vigorous and sustainable economic growth while promoting better resource management and efficiency. These two elements, I believe, can and should be linked together to benefit the country's economic progress and competitiveness.

The renewable energy opportunity

Renewable energy technologies are experiencing explosive growth globally as resource depletion, aging infrastructure, energy security and global warming make old energy technologies untenable. The global market for renewables grew 39% last year to $55 billion and is projected to quadruple in the next ten years to $226B.[i] This level of growth is akin to that of the PC,

wireless and internet industries during their heyday. Ten years ago, venture capital investment in new energy technology was less than $50 million annually. Last year, it was $2.4 billion out of the total venture capital investment that year of $24 billion. That means that $1 of every $10 of venture capital investment went into a clean energy technology company. That number looks like it may grow 50% in 2007, and show steep increases over the next several years. No wonder clean energy is being touted as the growth industry of the 21st century and is expected to create hundreds of thousands of new jobs and successful companies on the scale of this country's current largest corporations.

U.S. competitiveness in renewables

That's both an opportunity and a problem for the U.S.. Today, of the top ten wind companies in the world, only one – GE - is headquartered in the U.S. Sadly, though, not one of the top ten solar companies in the world, is headquartered here.[ii] I experienced firsthand the lead this country had in wind and solar technologies in the 80's. We lost this lead because of the market instability created by the lack of consistent, predictable policy at the federal level.

The lack of U.S. opportunity compared to global opportunity is shown in another fact, that all three of the

top U.S. solar cell manufacturing companies that have gone public recently, are locating their factories in West Germany, East Germany, the Philippines, and Malyasia, not in the U.S. Why? Because of manufacturing economics, incentives by those governments and lack of a strong stable market for their products in the U.S.

Today, we have another opportunity, another chance at capturing the economic benefits for the U.S. from the technology investments that we have made - and here, the "we" is both taxpayer investment through DOE programs and private investment through funds such as Nth Power. We have another chance to get it right. Our country possesses unique assets including our high tech talent pool, world class research in renewables and technology advances in materials, communications, and IT which are rapidly bringing down the cost of renewables. While Europe and Japan lead in the installation of renewable energy, the majority of venture capital investing in clean technology is focused on start-up companies in the U.S. We can and must support this effort.

Benefits of National RES

A national renewable energy standard or RES is widely recognized as a fundamental, market-making policy that

will drive innovation, investment and domestic market growth . This committee has undoubtedly heard the benefits of a national RES but let me reiterate the key ones. According to the Union of Concerned Scientists, a national RES for 20% renewables by 2020 would create 185,000 jobs within 13 years, attract $66.7B in investment capital and prevent CO2 emissions equal to taking 36.4 million cars off the road. [iii]

Energy policy drives innovation

In March of this year, E2 surveyed the leading investors in the clean energy sector. The results clearly show that energy policy drives investment and innovation. 84% of investors surveyed said that a clean energy public policy stance is a driver in bringing new business and investment to a region. 72% said that current federal policies regarding clean energy affected their likelihood of investing in U.S. companies and 65% specifically identified a national renewable energy standard as a critical or important factor in their investment decisions.[iv] In addition, a national RES has a multiplier effect. A market-making policy such as a national RES will not only influence the amount of venture capital investment, but also the amount invested in business expansion and in related project finance investments. A good example of this is one of my portfolio companies

that I alluded to above. Evergreen Solar is a photovoltaic solar manufacturer now listed on Nasdaq. Evergreen Solar commercialized solar technology developed by MIT, and located its initial facilities in the nearby Boston area. When it was time to expand their manufacturing and quadruple capacity, however, the Company chose to build their plant close to the market -
---which was Germany not the U.S.
All of us want Evergreen's next major expansion to be here, creating more jobs and increasing the energy security in this country. A national RES would help make that happen.

Two case studies: California and the Pacific Northwest

In the absence of federal policy, 24 states and the District of Columbia have passed Renewable Energy Standards. How have state renewable energy standards affected investment and jobs? Let me cite statistics from my part of the country, California and the Pacific Northwest states of Oregon and Washington. All three states have now passed Renewable Energy Standards.

Two years ago, I testified in a joint session of the California Senate and Assembly on a state RPS. At the time, I predicted that $11B of capital would be invested in clean energy companies and projects by the year 2010. In only two years, the industry has exceeded

these goals. Last year, Washington State was second in the country in wind capacity additions.[v] The Pacific Northwest added 954 MW of wind power bringing rural communities $1.38B in new capital investment, 1,300 construction jobs and $2M-$3M in annual royalty payments to farmers and rural landowners.[vi] And, in California and the Pacific Northwest combined, venture capitalists invested $1.25B in regional, clean technology start-ups, roughly half of all investment in the clean technology sector.[vii] It's no surprise that venture capitalists like to invest in companies where there is market demand in their backyard and the three state RES's have helped create that demand.

Renewables growth nationally

But, it's not just the West Coast that's benefiting from the growth in clean energy. The industry is growing nationally, but this could be accelerated greatly by a national RES. All regions of the country saw venture capital investment in clean technology increase between 2005 and 2006. While 60% of Nth Power's investments are in companies headquartered in California and the Pacific Northwest, the rest of the firm's portfolio is spread among 13 other states. One of our investments is in Jackson, MS so I spend a fair amount of time in that state. As such, I am well aware of the concerns expressed about the uneven distribution of renewable

resources across the country. The South, for instance, does not have the wind resources of other regions. But there, biomass power could play an especially important role in meeting clean energy goals. A national RES could help jumpstart a southern biopower industry. This could provide major new opportunities for farming and rural communities hit by the decline in tobacco consumption, wood product/paper exports and threatened with loss of cotton supports due to international trade conflicts. Using EIA assumptions, biomass crop payments to the South, under a 15% RES, would be $15.4B or 45% of the national total in the year 2020. [viii]

RES and next generation transportation

A technology sector that is attracting a lot of attention from clean technology investors is transportation. Many of us in the venture capital community predict the rapid proliferation of PHEVs or plug-in hybrid electric vehicles over the next decade. If we're right, electricity will become one of the fuels of choice for transportation. If we do not want plug-in hybrid electric vehicles to be reliant on fossil fuels, we need to spur the expansion of the domestic renewable energy market. Let's use a national RES to encourage clean and energy independent transportation.

Let's also design a national RES that the majority of our country can agree with, can adopt, can accept and therefore will implement. The venture capital industry seeks a national commitment that is broadly accepted and implemented.

Conclusion

Clean technology, and the creation of clean energy is a real industry with serious companies and serious investors. The market drivers point to exponential growth over the next decade driven in part by high oil prices, energy security concerns, global warming and aging infrastructure.

We can lead that growth or we can watch this industry grow in (and benefit) other countries. This is the decision we now face.

This country has the opportunity to capitalize on this growth industry by establishing a predictable market for investors and entrepreneurs through the passage of a national RES. With predictable markets, capital investment will flow, new technology will be fostered and the country will gain the benefits of an industry that will create hundreds of thousands of jobs in both rural and urban America while promoting energy security and developing solutions to address global climate change. I urge you to pass a national RES. Thank you for giving me the chance to express my views.

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[i] Clean Edge and Nth Power, Clean Energy Trends 2007, www.cleanedge.com/reports-trends2007.php
[ii] Remarks by Michael Eckhart, President of ACORE, Renewable Energy Finance Conference – Wall Street, June 2007
[iii] http://www.ucusa.org/clean_energy/clean_energy_policies/cashing_in.html
[iv] "Cleantech Venture Capital: How Public Policy Has Stimulated Private Investment::, E2 and CleantechVenture Network, May 2007.
[v] Http:/www.eial.doe.gov/cneaf/solar.renewables/page/prelim_trends/rea/prereport.html
[vi] Renewable Northwest Project, "Wind Power & Economic Development: Real Examples from the Pacific Northwest," January, 2007
[vii] Clean Edge and Nth Power, Clean Energy Trends 2007, www.cleanedge.com/reports-trends2007.php
[viii] Energizing Rural America: How Renewable Electricity Standards General Rural Economic Prosperity, pp. 8-9

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The CHAIRMAN. Thank you, Ms. Floyd.

Mr. Sloan. Our next witness is Mike Sloan, Managing Consultant of The Wind Coalition based in Austin, Texas. Mr. Sloan has been active in Texas renewable energy debates since 1997, including being part of the Texas PUCs renewable energy working group. He was appointed by then Governor George W. Bush to serve on the Texas Energy Coordination Council.

We welcome you, sir. Whenever you're ready, please begin.

STATEMENT OF MIKE SLOAN

Mr. SLOAN. Thank you, Chairman and esteemed Members. I'm here to talk about the Renewable Energy Standard in Texas and the related policies that have really helped make the wind industry there the premiere market for wind power, at least in the United States, if not the world. And to put it in a nutshell, one thing I want to sort of underscore from the Texas experience is that you can get quick results with proper policies, significant results very quickly.

I want to skip over and talk about the level of wind that's going into Texas right now. Last year, Texas passed California to become the number one state for renewable energy. This is going from zero 12 years ago where Texas literally had the lowest percentage energy use of renewables in the whole country, ranked 51st, even my District of Columbia. So it's come a long way very quickly and since last year, it has almost doubled its amount of wind power.

This year, there's about $3 billion worth of wind projects going into the State of Texas, about 2000 megawatts. There's many more that are queued up, that have signed interconnection agreements, over 3600 megawatts that are waiting to come on. Some fraction of those will not be able to come on because there's inadequate transmission infrastructure. If you look out further, there is a tremendous amount, nearly 40,000 megawatts of wind are exploring coming onto the system in Texas, and there simply is not infrastructure or market to support that right now.

Only a modest fraction of that will come on, so there's some work to do, particularly on the infrastructure. And that's one new area that Texas has stepped in and really stimulated the market is a competitive renewal energy zone concept. It's a proactive transmission planning regime and the State of Texas, an interim final order is expected this week and it will designate eight different areas out in West Texas that will have associated transmission plans that will support at least 10,000 to up to 26,000 megawatts of windpower. This is from a single state. So it shows that things can move forward quite quickly.

I will just mention that last year and again this year that the wind installations going into Texas are actually greater than the combined power plant additions from all other kinds of power plants in Texas, very significant.

On the policy side, how Texas has done that, it's a combination or a suite of different policies. First off, it did deliberative polls for education, it wanted to find out what did customers really want and they found out that customers wanted renewables. This was done about 10 years ago. Then the RES was developed as a cata-

lyst. It is a catalyst to increase use of renewable energy. So that operates on the demand side, creates the demand.

I will mention you can get diversity in a Renewable Energy Standard, but you have to work on it. But there are some methods to do that. That was not what was done in Texas, though. That one is just the cheapest resource is what is done, so it is predominately wind power. I will mention that within three years, going from a legislative concept to a billion dollars worth of projects on the ground took less than three years in Texas. So you can move very quickly.

We also have a renewable energy credits program that has really helped stimulate the voluntary markets that make the renewable goals happen faster than legislative requirements.

A key thing about the competitive renewable energy zone, as has been pointed out, the good resources generally are in rural areas, not where the people are. So you have to have infrastructure. Texas went through a serious contested case. Over fifty parties were involved, and they made a decision that this is good for the state and they are going to move forward with major transmission.

Also very important is the role of incentives. If you're going to have an RES that requires people to use it, it makes it much more appealing if you can have incentives that bring down the production cost to put it on par with other resources. That brings less opposition then from utilities that want to use it if you can get these where they are competitive. And the production tax credit has played a critical role, the federal production tax credit, in wind power in the State of Texas.

If you look, when the production tax credit has expired, both after 1999 and 2001, even in Texas, which is the best wind market in the country, there were zero megawatts installed the following year. So it is really a combined package that works together to make it happen.

There are a couple lessons learned that I want to mention. A real key one is that the Renewable Energy Standard has expedited market action. There's nine investor-owned utilities in Texas, and if you look at those that had a requirement under the RES and those that didn't, those that had the requirement voluntarily bought more renewable energy for those that didn't buy any voluntarily. And it just shows that it's really a catalyst. You're forcing these companies to look at it. When they get more experience, they get comfortable with it and move on. It has had a lot of benefits. It is saving consumers money and really helps the rural areas. Thank you.

[The statement of Mr. Sloan follows:]

Testimony of Mike Sloan

Managing Consultant
The Wind Coalition

before the House Select Committee on
Energy Independence and Global Warming
Hearing on "Renewable Electricity Standards: Lighting the Way"

September 20, 2007

My name is Mike Sloan, Managing Consultant of The Wind Coalition ("Coalition"). I am appearing today to provide information about how a Renewable Electricity Standard (RES) and related development policies have fostered a robust wind industry in Texas. The Wind Coalition is an association of 25 companies, trade associations, and environmental and consumer groups that promote the use of the abundant wind energy resources of the South Central United States in Texas, Oklahoma, Kansas, New Mexico, Arkansas, Missouri and Louisiana.

OVERVIEW

Wind power is a cost-effective and readily available technology for zero emission and zero water consumption electricity generation, capable of being added rapidly to contribute meaningfully to state and national electric needs. Wind power is broadly recognized as among the most important near-term elements of the climate solution. The Texas experience offers several observations applicable to consideration of a national RES:

1) Wind power is ready to play a significant role in meeting America's energy needs;

2) Stable policy support is essential for renewable energy to succeed;

3) Transmission infrastructure can and must be built to meet State or Federal RES.

The success of the Texas wind industry is a leading example of how government leadership combined with well-conceived policies can effectively catalyze clean energy development. This wind power success story is even more remarkable coming from Texas, which is not traditionally considered among the vanguard of environmental policy.

STATUS OF WIND POWER – A SIGNIFICANT TEXAS ENERGY INDUSTRY

Prior to November 1995 – less than twelve years ago – there were no commercial wind projects operating in Texas. At that time, Texas used less renewable energy on a percentage basis than any other state in the nation. A focused effort by Texas policy-makers to stimulate renewable energy development through a RES has proven very

effective. During 2006, Texas passed California to become the nation's #1 producer of wind energy. Bolstered by a proactive transmission policy that will ensure transmission infrastructure is developed to the state's best renewable resource areas – a policy known as "Competitive Renewable Energy Zones" (CREZ) – interest in Texas wind development has skyrocketed. During 2007, Texas is expected to add approximately 2,000 MW of wind capacity – an investment of more than $3 billion – that represents more than half of anticipated wind power installations in the U.S. for the year.

In a measure of *current* interest in wind power, information from the Electric Reliability Council of Texas (ERCOT; the grid operator for the majority of Texas) suggests capacity additions of wind power will exceed the *combined* capacity additions of all other types of power plants (coal, gas, nuclear, etc.) during 2006 and again in 2007.

In a measure of *future* interest in wind power, as measured by ERCOT's total generation interconnection request activity, there is presently greater investor interest in building new wind power facilities than in building any other type of power plant. In-service wind plus all wind generation interconnection activity in Texas total more than 40,000 MW.

Clearly, wind power is not awaiting a technology breakthrough. Based on current incentives and regulations prevailing in the energy sector, wind power is competitive today in many states and can be developed quickly relative to other types of power plants. Wind power is ready to play a significant role in meeting America's energy needs.

Texas Wind Industry Vital Statistics

(Based on ERCOT data for 9/15/07; Southwest Power Pool (SPP) data for 8/15/07)

Wind Power Now "In-Service" Statewide: 4,525 MW *(includes not yet complete projects under construction that are delivering power to the grid today).*

New Interconnection Agreements for Wind Power *(most of these projects are likely to go into service during the next year or two).*

ERCOT Grid (serves most of Texas): **2,629 MW**
SPP Grid (Texas Panhandle): **1,045 MW** *(720 MW of which are suspended due to a lack of transmission and access to buyers)*

Wind Interconnection Requests for 2007- 2010: *(only a modest fraction of these current totals are likely to be installed, due in part to transmission shortages)*

ERCOT Grid: **26,897 MW Wind** *(all non-wind = 21,316 MW)*
SPP Grid: **4,496 MW Wind**

CREZ Transmission: The Public Utility Commission of Texas is expected to designate 8 areas as wind zones (CREZ) and authorize transmission plans sufficient to support aggregate wind capacity within Texas of at least 10,000 MW up to approximately 26,000 MW.

For reference, Texas' Peak Electric Load is approximately 72,000 MW and growing, motivating a need for a variety of new power plants.

STABLE POLICY SUPPORT HELPED FOSTER TEXAS' ROBUST WIND INDUSTRY

Texas has achieved success with wind power through a package of effective state policies that complement available federal policies in delivering significant results. These policies include: 1) Education through Deliberative Polls 2) An effective market catalyst through a Renewable Electricity Standard (RES), 3) Renewable Energy Credits (REC), 4) Competitive Renewable Energy Zones (CREZ), 5) Appropriate producer incentives such as the federal Production Tax Credit (PTC) and state property tax abatements. Texas' success is a credit to visionary state policy makers and regulators and the broad cooperation of consumer, environmental and energy industry stakeholders.

1) Education: Texas Deliberative Polls™, 1996-1998. These utility-conducted polls showed Texas electric customers overwhelmingly wanted cleaner energy resources. The poll results were helpful to Texas legislators, utilities and other stakeholders in developing support for a RES mechanism requiring a minimum level of renewable energy use.

Utility Customer Deliberative Poll Results for 8 Utilities in Texas
First Choice Preference among residential customers (assuming cost is same)
49% prefer Renewables (Solar, Wind, Biomass)
31% prefer Reduce Need (Energy Efficiency)
14% prefer Fossil (Gas, Coal)
5% prefer Buy & Transport from others

2) Effective Market Catalyst: Renewable Energy Standard (RES), 1999 & 2005. Texas goal for renewable energy is a leading example of a Renewable Electricity Standard that: (a) promotes the use of renewable energy (b) Sets minimum levels of renewable energy use for sellers of electricity and (c) established penalties for insufficient use of renewables. The RES has proven to be an exceptional catalyst, going from legislative concept to $1 billion worth of on-the-ground renewable energy production facilities in less than 3 years. The early success of the program led to an expansion of the RES in 2005.

February 1999 – RES is legislative concept
May 1999 – Texas legislature passed SB7, which included RES
December 1999 – RES implementation rules completed
January 2000 – utilities begin solicitations for renewable energy
December 2001 – 912 MW of new wind projects in service in Texas.

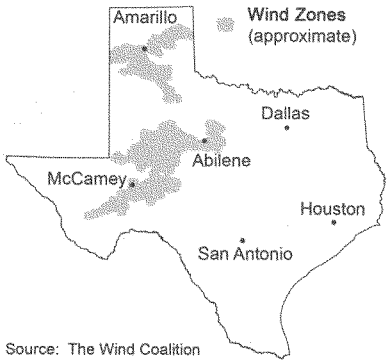
3) Flexible Mechanism to Stimulate Voluntary Market: Renewable Energy Credits. The currency for authenticating compliance with the RES is Renewable Energy Credits (RECs), which represent 1 Megawatt-hour of generation from a qualified renewable energy generator. RECs have become a convenient and accepted method of validating voluntary purchases of renewable energy as well. Voluntary renewable energy markets drive additional demand beyond the Texas RES and have resulted in Texas becoming a leader in voluntary green power sales.

4) Ensure Transmission Infrastructure: Competitive Renewable Energy Zones. CREZ is a proactive policy to provide transmission to the best renewable energy areas, playing an essential role in facilitating the renewable energy market. The basic steps of any proactive transmission development process are:

1) Identify the Best Resource Zones

2) Develop a Transmission Master Plan

3) Begin Building Transmission to Zones



Source: The Wind Coalition

The Public Utility Commission of Texas (PUCT) is in the midst of a contested case to establish CREZ. An interim final order is due this week. A map identifying the approximate areas that have been verbally designated by the PUCT as CREZ are identified in the map. Additional analyses are now underway to optimize transmission plans to accomodate wind power from these CREZ at levels between 10,000 MW up to approximately 26,000 MW and to evaluate integrating high levels of wind power into the ERCOT system. A final decision on CREZ and specific transmission lines is expected approximately March 2008.

5) Incentives: Federal Production Tax Credit (PTC) and State Property Taxes

Wind power has higher up-front costs than most conventional power plant alternatives, thus presenting a higher hurdle for investors to justify. Prudent incentives to promote investment in new technologies are often needed, and in the case of Texas, such incentives have proven effective.

The Federal Production Tax Credit (PTC) has played a critical role in the effectiveness of the Texas RES. Examination of the history of Texas' wind development indicate an extreme boom-bust cycle directly tied to the availability of the PTC. Even for Texas, the most attractive wind development market in the country, the years following PTC expiration in 1999 and 2001 resulted in statewide wind installations of *zero MW*. In contrast, during the last 3 years, during which the PTC has been in effect continuously since September 2004, installations have grown steadily. A full value, long-term federal PTC extension is a natural compliment to an effective National or State RES .

Texas does not have personal income taxes which results in a relatively large property tax burden relative to other states. Due to wind's high up front cost, wind power has a relatively higher property tax burden per unit of energy produced compared to conventional power plants. The availability of Texas' economic development program offering partial property tax abatements has coincided with Texas' recent steady growth in wind installations.

TRANSMISSION INFRASTRUCTURE MUST BE BUILT TO MEET RES

Even with a well-functioning RES, Texas has encountered significant problems in growing its wind power installations due to prevailing transmission shortages. While wind can be developed quickly, transmission lines take much longer to develop. The Texas CREZ process is expected to be an effective solution to break through this classic "chicken-and-egg" problem. This problem threatens virtually all of the nation's premier wind resource regions.

Other states are beginning to evaluate the possible use of the CREZ transmission planning tool, including Colorado and California. Fortunately, grid planners are also responding to the widely recognized shortage of infrastructure by conducting planning studies to accomodate moving large levels of wind power from the best wind production areas to consuming regions. It is imperative that transmission infrastructure be planned in parallel with a national RES, to enable the two-way transfer of a diversity of renewable energy resources, such as wind from the plains, geothermal from the west, solar from the southwest, and bioenergy from the southeast.

TEXAS RES – SOME LESSONS LEARNED

1) RES expedited market action on renewable energy. Prior to electric industry restructuring, Texas had nine investor-owned utilities in the electric sector. The results of the first compliance year of the Texas RES (2002) yield a remarkable finding: that utilities with a RES obligation bought far more renewable energy *voluntarily* than those that did not have any RES obligation.

Renewable energy purchases by Texas' incumbent investor-owned electricity providers

6 Companies with No RES requirement in 2002 procured 1 MW of renewables

3 Companies with an RES requirement in 2002 purchased approximately 310 MW as required and voluntarily purchased an additional 300 MW of renewables beyond their RES obligations.

2) RES has produced more benefits than costs. Since 2001, wholesale wind power prices within Texas have been competitive with wholesale market prices. Some electric utilities in Texas, including Xcel Energy and Austin Energy, have reported that certain wind power contracts have enabled them to lower the bills of their retail customers. In a more general sense, the "cost-effectiveness" of wind power is a difficult question to answer. This is not due to the costs associated with wind – which are reasonably predictable even decades into the future – but rather, due to high uncertainties for future environmental compliance and fuel costs associated with competing energy technologies. For the Texas wholesale market, perhaps the most significant substantiation of the cost-effectiveness of wind derives from the willingness of investors to risk billions of their own capital on new wind power projects.

As part of the CREZ process, ERCOT conducted extensive analysis of various transmission plans. Brendan Kirby of Oak Ridge National Laboratory analyzed ERCOT's assessment and offered several conclusions regarding the cost and benefit of wind power:

- In all cases, fuel cost reductions stemming from increased wind power installations exceed the cost of CREZ transmission lines;
- Existing wind power saved Texas consumers $476 million in 2006;
- 5,250 MW of new wind in Texas (the largest scenario evaluated by ERCOT) reduce wholesale customer payments to generators by $1.278 billion per year.
- 5,250 MW of new wind installations in Texas would reduce statewide emissions of carbon dioxide, nitrous oxide and sulfur dioxide by 3-5%.

Texas is currently contemplating scenarios that are up to 4 times larger than this 5,250 MW level, suggesting billions in potential electric cost savings and relative emission reductions levels that could exceed 15%.

3) Texas RES has delivered Substantial Economic Development Benefits.
Illustrative of abundant economic development benefits associated with Texas' RES are:

- Thousands of direct new jobs created in manufacturing, development, construction and maintenance of wind projects;
- Sizable boost in indirect jobs, especially in rural communities;
- Several communities have built new schools with revenues from wind projects;
- Texas Tech University has created a new PhD program in wind energy;
- New wind manufacturers and operations have moved to Texas;
- Millions in royalty payments to landowners

CONCLUSION

The Texas experience shows that renewable energy can be added into the system quickly and cost effectively. Stable, well-conceived policies have played a major role in stimulating the Texas wind market and delivering significant benefits for Texas' environment and its ratepayers.

Thank you.

Mike Sloan
Managing Consultant
The Wind Coalition
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Austin, Texas 78701
512-476-9899

The CHAIRMAN. Thank you, Mr. Sloan, very much. Our next witness, Chris Hobson, is from the Southern Company. Mr. Hobson currently serves as the Southern Company's senior vice president for research and environmental affairs. He has been with the Southern Company since 1973. Thank you, sir.

STATEMENT OF CHRIS HOBSON

Mr. HOBSON. Thank you. Mr. Chairman, Congressman Sensenbrenner and Members of the Committee, thank you for letting me have the opportunity to come to you and talk to you today about the use of renewable resources in the production of electricity.

Southern Company serves 4.3 million customers in the States of Georgia, Alabama, Florida, and Mississippi. We also provide competitive wholesale power in those four states and in the Carolinas. And we do that through a diverse portfolio of energy sources. We use coal, nuclear, natural gas, and renewable resources. And renewable resources have played an important role in the electric system that we operate in the Southeast.

Over a hundred years ago, the first power plants in Alabama and Georgia were hydroelectric plants. And even today, those same plants provide important renewable resources of peaking power for our customers. Southern Company believes that the use of renewable resources for power generation can be increased, and we are working hard to make sure that that happens.

We've been researching and testing various non-hydro-renewable technologies for years, including biomass, solar, wind, and landfill menthane. But in the Southeast region, traditional renewable resources have their challenges. For instance, biomass is probably the most abundant non-hydro-renewable resource in our part of the country. We've been testing ways to use biomass not only in coal firing in traditional coal-fired power plants, but also in repowering applications.

And while the increase in the use of biomass has some promise, there are challenges. These include the high cost of handling and transporting biomass and dealing with a much lower heating value compared to fossil fuels. Additionally, the cost of using biomass will likely go up as the demand increases to meet the new cellulosic ethanol requirements of the energy legislation.

Department of Energy data shows that wind has very limited application for power generation in the Southeast. Our written testimony shows the DOE map that shows the large absence of commercially available wind in our region. We have, however, done considerable research to see where wind resources might be available to us. We've worked with Georgia Tech on a study of offshore wind possibilities off the coast of Georgia. We have worked with TVA on the potential for wind located on mountain ridgetops in northern Georgia and eastern Tennessee. We're following up on those studies.

But overall, we agree with DOE that the potential use of wind for power generation in the Southeast is very limited. Our research and DOE data have also shown that the use of solar energy is limited in the Southeast. It might not be readily apparent, but cloud cover and humidity lower the amount of solar radiation available

for power generation in the Southeast as compared to other areas of the country like the Southwest.

Solar is extremely high cost and its lower availability for power production means that it will not be a large source of energy production. We're working with local governments to tap into sources for landfill methane. This will be a good source, resource, for small applications for power generation.

So why are we committed to increasing the role of renewable resources in our region? We think that federal mandates that would impose a single one size fits all standard for renewables across the country is the wrong approach. Such an approach was added to the House bill this past summer, and that requirement mandates 15 percent of the utilities' retail sales must come from a limited set of renewables, such as wind, solar, biomass, and geothermal.

If a utility doesn't have access to those renewable resources in order to meet the standard, we must either buy credits from developers in some other part of the country or more likely pay an alternative compliance payment to the federal government. This would be punitive to regions that don't have resources to meet such a standard like the Southeast. Having to otherwise purchase credits from developers in other parts of the country or write checks to the federal government essentially imposes a tax on the customers of resource-poor areas.

As you can see in our written testimony, we've assessed the impacts of that 15 percent mandate on our customers. Since we don't have enough resources available to meet the requirement, we would have to comply by buying credit or making alternative compliance payments to the federal government that will result in our customers paying over $1 billion every year to comply.

Alternatively, states have taken the lead in developing renewable programs. This approach has allowed states and local governments to take into account the regional differences on renewable availability. There are 25 states with renewable portfolio standards today and those are tailored to make sense for those states, not for our country. It is significant that not one of the 25 state programs is consistent with provisions included in the House energy bill this summer.

We operate in the State of Florida. The State of Florida is considering renewable portfolio standards. We're working with that state for the development of a program that will make sense for Florida, but not necessarily make sense for other states. As I've said, we're working to find ways to increase the use of renewables in a cost-effective way in our energy mix. We believe that the current approach of federal incentives and funding for research and development, coupled with the development of state renewable programs is the best way to bring renewables into the marketplace.

This avoids a federal single standard that in resource-poor areas of the country will simply mean a tax on electricity for consumers. We don't think that is good energy or good environmental policy.

Thank you, Mr. Chairman.

[The statement of Mr. Hobson follows:]

Select Committee on Energy Independence & Global Warming Hearing on Renewable Electricity Standards, September 20, 2007

Testimony of Chris M. Hobson,

Senior Vice President, Research and Environmental Affairs

My name is Chris Hobson and I am Senior Vice President, Research and Environmental Affairs, for Southern Company. In this position I am responsible for environmental issues, as well as for the development of technologies that support the generation, transmission, distribution and end-use of electric energy. I am testifying today concerning Southern Company's experience with and outlook for renewable energy options in the Southeastern United States. I will also address Southern Company's experience with State renewable energy programs and our views on a federal renewable portfolio standard.

Southern Company is a vertically integrated utility system serving both regulated and competitive markets across the southeastern United States. Through our four independent operating companies — Alabama Power, Georgia Power, Gulf Power and Mississippi Power — we serve more than 4.3 million electric customers. Through our Southern Power subsidiary we also provide wholesale competitive power to customers in our service area as well as other parts of the Southeast.

In serving this retail and wholesale load we operate a diverse supply of electric generation facilities. Around 70% of our electric energy is generated with coal, 15% is from nuclear power, 11% from natural gas and the remaining 3% from hydropower. We are working continuously to enhance and improve our capability to meet the ever growing demand for energy in our region. The U.S. Census Bureau estimates that by 2030 some 40% of the population of the U.S. will live in the Southeast and they will need reliable and affordable energy to grow and prosper. We estimate that we will need to add 15,000 megawatts of additional electric generating capacity by 2025 to meet that growth. We are working to meet that capacity need with the addition of new nuclear capacity and the development and construction of advanced coal generation. We are in the licensing process of adding two additional nuclear generating units at our Plant Vogtle site near Waynesboro, Georgia which should come on line in 2015 and 2016. Also on September 10 of this year we broke ground in Orlando, Florida for the construction of a new integrated coal gasification combined cycle facility to provide power to the Orlando Utilities Commission. These new advanced technologies along with natural gas generation, renewable energy and energy efficiency and conservation will be needed to meet the ever increasing demands for electric power in the Southeast and around the world.

While meeting these future energy challenges we are also expending a tremendous amount of resources to minimize the environmental impact from our existing fleet of power plants. Since 1990 we have spent some $2 billion on equipment to reduce emissions from our coal-fired plants and over the next three years we will spend another $4.6 billion to reduce the emissions of sulfur dioxide, nitrogen oxides and mercury even further.

Southern Company Efforts to Promote the Use of Renewable Energy

We believe that renewable resources have a role to play in meeting the increasing demand for energy. Even with limitations on the availability of wind and solar in the southeastern U.S. we believe that progress can be made in increasing the use of renewables in our energy mix and we are committed to such a goal. For example we operate 3,400 MW of hydro-electric capacity in Alabama and Georgia which provides some 3% of our customer's needs. This renewable resource provides a low cost means of energy storage that helps us meet peak demands on our system.

Biomass. Biomass, whether derived from agricultural crops or wood, has the highest potential for providing renewable electricity generation in the Southeast. Switchgrass is a hardy, highly productive prairie grass that has potential as a renewable energy fuel. We have conducted co-firing tests of switchgrass with coal since 2001. We are also working with the National Forest Service in a project to test the feasibility of using small diameter wood available from forest thinning activities for blending with coal in a coal-fired boiler. Co-firing tests are scheduled for late 2007. There are challenges with biomass blending approaches, as material handling issues and the loss of heating value impose limitations on the amount of biomass that can be co-fired with coal. Further research and tests are under way however.

The next step in investigating the use of biomass for power generation is examining the feasibility of repowering existing coal units or building new units to utilize biomass for 100% of the generation as compared to co-firing. We are working with the Electric Power Research Institute to define capital costs, operating and maintenance requirements and commercially available options for converting small generating units from coal to 100 percent biomass. Challenges to this approach include the significant de-rating of the unit when converted from coal to biomass (it is estimated that biomass will only produce one-half the power that a unit fired with coal would produce) and the economic, environmental and logistical issues associated with transporting biomass over long distances for use in a generating facility.

Wind. As shown in Figure 1, National Renewable Energy Laboratory (NREL) studies show that the presence of commercially available wind resources in the southeastern U.S. is severely limited. This is especially true for on-shore resources. Southern Company has investigated the amount of commercially viable wind off-shore the coast of Georgia. We partnered with Georgia Tech to conduct a study to examine the feasibility of generating electricity from wind off the Georgia coast. Results of the study show that although there are potentially viable winds some 5 miles off the coast the commercial application is limited due to the low wind speeds during the summer months when the electricity need is greatest, the high construction cost in off-shore environments and the fact that wind turbines are not guaranteed to survive even a minimal Class 3 hurricane.

Mountain ridge-top locations are remote, requiring incremental costs for developing access roads and power transmission infrastructure. Moreover, the hilly terrain increases the complexity of installation and the overall costs of wind energy due to variations in wind flows observed in mountainous regions compared to flatter landscapes. This variation is depicted in Figure 2,

below which illustrates the variable directional wind flow that can exist in mountainous areas. This variation tends to decrease the amount of usable energy that can be extracted from the wind, resulting in lower capacity factors. Reduced capacity factors increase overall cost per kilowatt-hour of energy generated.

These factors taken together lead us to conclude that wind resources in the Southeast, unlike other areas of the country, are limited, costly and not of sufficient quality to support large amounts of utility-scale wind generation.

We will continue to pursue the potential development of wind energy resources in off-shore coastal waters. There will have to be large advances in the development of lower-speed and hurricane tolerant wind turbine designs. Even with technical advances the still limited available wind in the Southeast as well as the intermittent nature of wind energy make the potential contribution of wind to meeting the energy needs of our customers will be low.

Solar. Southern Company has evaluated numerous solar options over the past 20 years including operation of thermal solar collectors, solar dish/stirling technology and photovoltaic arrays. There are severe limitations in the amount of solar energy available in the Southeast however. Figure 3 is a Department of Energy map showing the much lower amount of solar available in the Southeast as compared to other regions of the U.S. Key challenges are the very low availability of solar power during a 24 hour period and the extremely high costs per kilowatt hour compared to other sources of electricity. Tests have indicated that solar will only provide power about 15% of a 24 hour period, requiring some other power source during the remaining 85% of the time. Also current cost estimates for solar are over 25 cents/Kwh as compared to the average 7-8 cents/Kwh for our residential customers. Future technology developments might bring this cost down somewhat but it is unlikely to ever reach the same costs as other power options.

Landfill Gas. The capture of methane from municipal landfills is a source of renewable energy that we have tapped. In 2006 Southern Company subsidiary Georgia Power began working with a local landfill in DeKalb County to produce power from methane capture. Some 2.5 megawatts can be produced from this landfill project. Other applications are being examined although the total amount will be limited by the number and age of landfills.

Renewable Portfolio Standards in the Southeast

None of the four States in Southern Company's service area currently have renewable portfolio standards. This has been limited by the low availability of renewable resources in the region as compared to other parts of the nation. The State of Florida is currently evaluating adopting an RPS program as proposed by Governor Charlie Crist. Southern Company subsidiary Gulf Power Company is working with the Florida Public Service Commission during its hearing process on an RPS to advance ideas that make sense for the State and its electric customers. This is consistent with letting States take the lead on developing renewable energy programs that can be tailored to circumstances particular to that State and its resources, cost of energy and customer needs.

Opportunities to Develop and Deploy Renewable Technologies in the Future

We continue to assess renewable power technologies available to augment and expand our generation portfolio. Figure 3 shows a wide range of renewables research and development projects under way across the Southeast. Even with the limitations of renewable resources in the southeastern U.S. especially wind and solar, we are committed to expanding the use of renewables in ways that can continue our history of providing reliable, affordable and clean energy for our growing customer base.

Implications of a Federal Renewable Portfolio Standard

Against this backdrop of the renewable resources available, we are concerned about mandates that would require us to utilize fixed amounts of renewable resources for electricity generation. Southern Company opposes a nationwide renewable energy mandate. We believe that mandates are an inefficient and potentially counterproductive means of increasing the production of cost-effective, reliable electric power from renewable sources. We prefer to seek cost-effective additions to our generation portfolio based on technological maturity, technical performance, reliability and economic cost.

The current strategy of providing incentives for the development of cost effective, reliable renewable resources that recognizes variations in the regional availability of such resources is the better approach and should be continued and enhanced. In our experience, the best way to increase production of renewable energy is through prudent investment in available resources and related research and development. Proposed Federal mandates would result in a diversion of massive amounts of financial resources to compliance payments, reducing resources available to spend on renewable energy, energy efficiency, and other clean energy resources.

A nationwide, Federal mandate similar to the "one size fits all" renewable energy standard recently adopted by the House of Representatives would penalize resource-poor regions and require the payment of billions of dollars to either renewable companies in other regions or more likely to the Federal government. The House-passed proposal would require 15% of retail sales to be from renewable by 2020, with an alternative compliance payment option of 3 cents per kilowatt hour payable to the Department of Energy. The House definition limits the definition of renewable to wind, solar, biomass, geothermal, ocean, tidal, landfill gas, and incremental hydropower. Partial credit may be allowed for certain energy efficiency measures, but only upon petition by a State governor. It is not clear how energy efficiency would be calculated, particularly in later years after the available opportunities for energy efficiency improvements have already been made.

Our estimates show that a 15% Federal renewable energy mandate would far exceed the available renewable resources in the Southeastern region. To replace 15% of the nation's retail energy by 2020 would require approximately 80,000 wind turbines of 2 megawatt capacity each, or 2,200 square miles of land (*i.e.*, an area larger than Delaware) for solar photovoltaic arrays, or 87,000 square miles of switchgrass fields (*i.e.*, an area the size of Minnesota). To replace 15% of just Southern Company's retail energy by 2020 would require approximately 6,900 wind

turbines of 2 MW capacity each, or 200 square miles of land for solar photovoltaic's, or 6,000 square miles of switchgrass fields (*i.e.*, an area the size of Connecticut).

The renewable energy potential of the Southeast falls far short of a 15% requirement. Figure 4 shows that that there is very little wind power generation potential in the Southeast. The most wind-rich areas of the Southeast are in scenic and environmentally sensitive areas, such as the mountaintops of the lower Appalachian Mountains and the Gulf and Atlantic coast areas. Figure 5 shows a similar lack of solar intensity in the Southeast. Figure 6 shows Southern Company's projected maximum potential renewable capacity through 2029. The total renewable capacity is not expected to exceed 800 to 1,000 megawatts in the years 2026-2029, including all renewable sources (other than existing hydropower). Even with such an enormous increase, Figure 7 shows that level of renewables would produce less than one-sixth of the approximately 6,000 megawatts of renewable energy required under a 15% mandate.

The House-passed language allows for no flexibility in the definition of renewable energy. Although the House bill allows credit for payments made under existing State programs, the amount of credit is tied to actual amounts of energy produced from renewable resources as defined from the program, not to the amount of the payment under the State program. Figure 8 shows the diversity of resources allowed under existing State RPS mandates. The House language would not allow credit for many of these regionally abundant resources. It is significant to note that not one of these existing State programs is consistent with the RPS language adopted by the House. Utilities in each of these States will have different and often conflicting requirements for both their State as well as the federal program requirements.

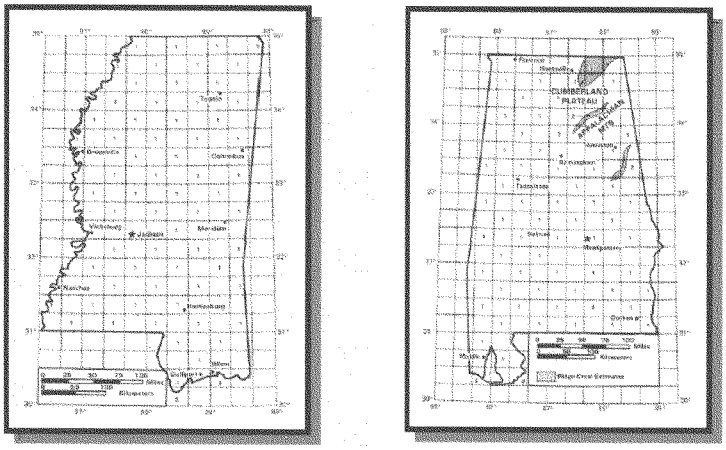
Because the renewable resources that would be required to comply with a 15% mandate are not available in the Southeast, Southern Company would be required to comply largely by making alternative compliance payments to the Federal government. Figure 9 shows the projected cost to Southern Company of a 15% by 2020 mandate with alternative compliance payments at 3 cents per kilowatt hour, as adopted by the House. This shows that our customers would be paying over $ 1 billion per year when the RPS requirements reach the 15% level and the cumulative cost to our customers through 2030 of such a requirement would total over $19 billion in nominal dollars. Because of the limited availability of renewable resources in our region and the fact that most of what is available will likely be more expensive than the 3 cents/Kwh price cap the majority of that $19 billion cost to our customers will simply be payments to the federal government. Thus a nationwide RPS mandate could cost electricity consumers in the Southeast billions of dollars in higher electricity prices, with no guarantee that additional renewable generation will actually be developed.

It is clear that efforts to increase the use of renewable resources for electricity production must recognize State and regional variations in resource availability, the intermittent nature of renewables and the challenge of producing and transmitting renewable energy in a way that protects the reliability and affordability of electric energy to customers. A federal "one-size-fits-all" mandate works against those goals and therefore the current strategy of providing incentives for the development and use of renewable energy should be maintained and enhanced.

Conclusion

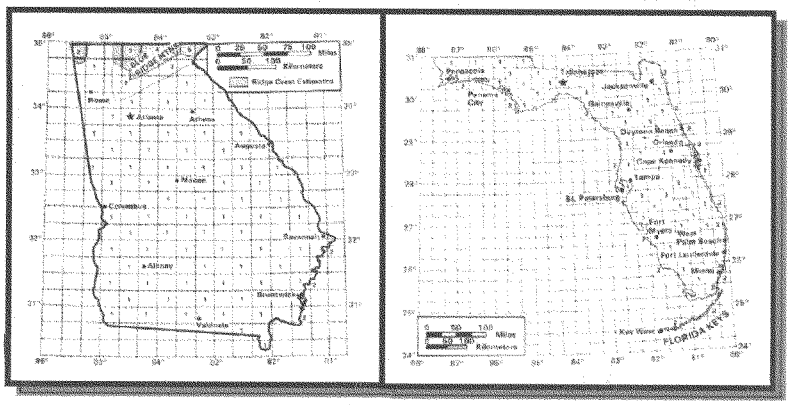
Southern Company has a long history of the utilization of renewable energy. We continually assess our generation options — including renewable resources — to provide low-cost, reliable energy to meet the growing demands for electric power in our region. Not every technology will be well-suited to every region of the country. We do believe that the use of renewable energy to produce electricity can be increased and we intend to play a key role in the research and development needed to reach such an objective. This is best reached by the enhancement of current strategies to provide incentives for the R&D as well as the use of renewable energy as compared to the adoption of a federal mandate for a single standard across the country. We will continue to work to facilitate generation technology options — including renewable energy — that ensures a reliable, affordable and environmentally sound supply of energy to meet the growing demands for electric power in the southeastern U.S.

Wind Generation Potential in Southern's Territory
Mostly Class 1 Winds



Source: Internet @ http://rredc.nrel.gov/wind/pubs/atlas/atlas_index.html

Wind Generation Potential in Southern's Territory
Mostly Class 1 Winds



Source: Internet @ http://rredc.nrel.gov/wind/pubs/atlas/atlas_index.html

Fig.1

Wind Generation Costs Dependent on Nature of Wind Resource
Need Class 4 or Higher for Economical Generation

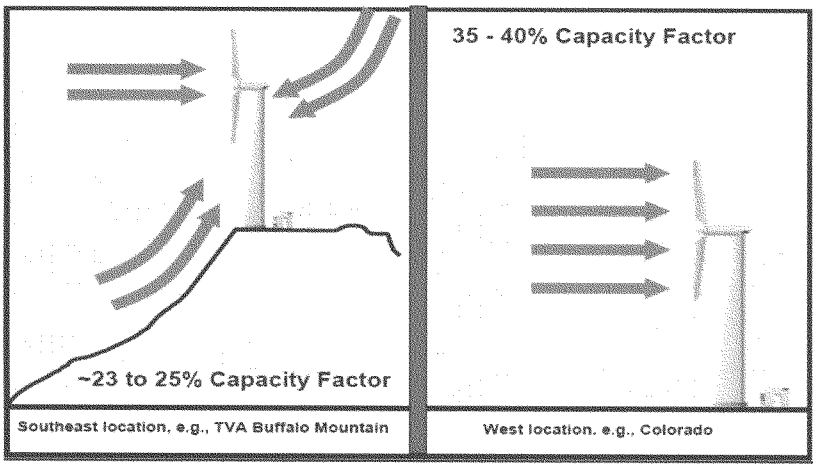


Fig.2

Renewable Power R&D Projects

Southern Company

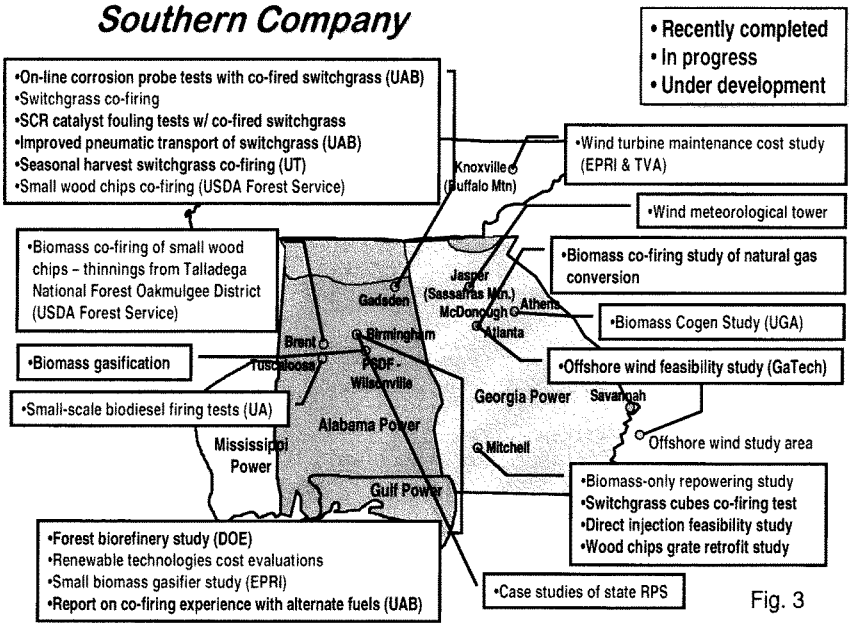
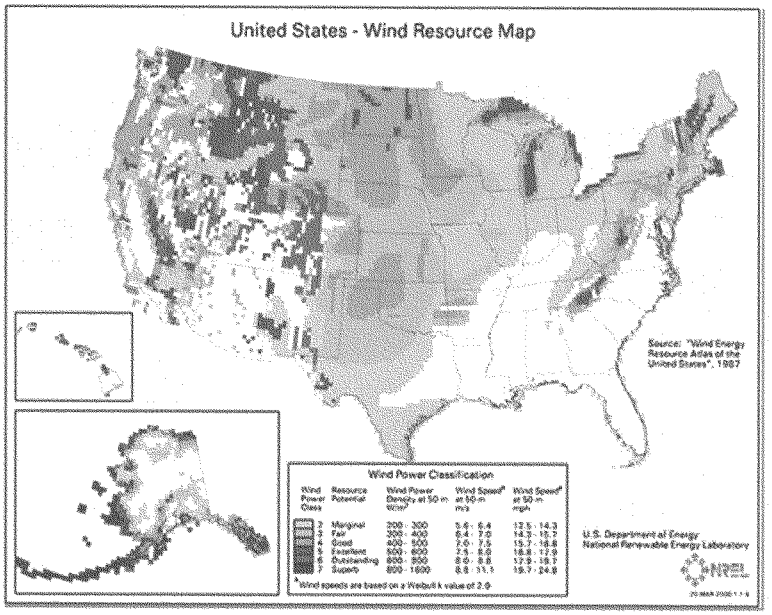


Fig. 3

Wind Power Generation Potential

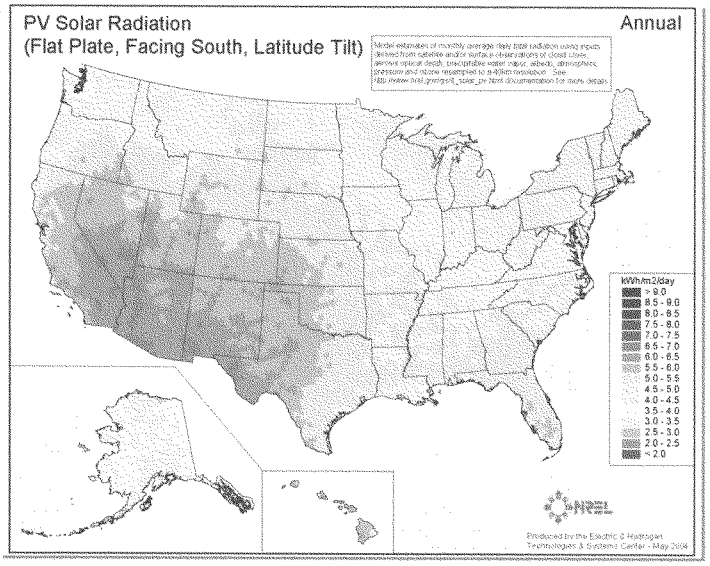
Wind Potential Rated from Class 1 to 7



Source: National Renewable Energy Laboratory

Fig. 4

Solar Intensity: United States



Source: National Renewable Energy Laboratory

Fig. 5

RPS Impact on Southern Company

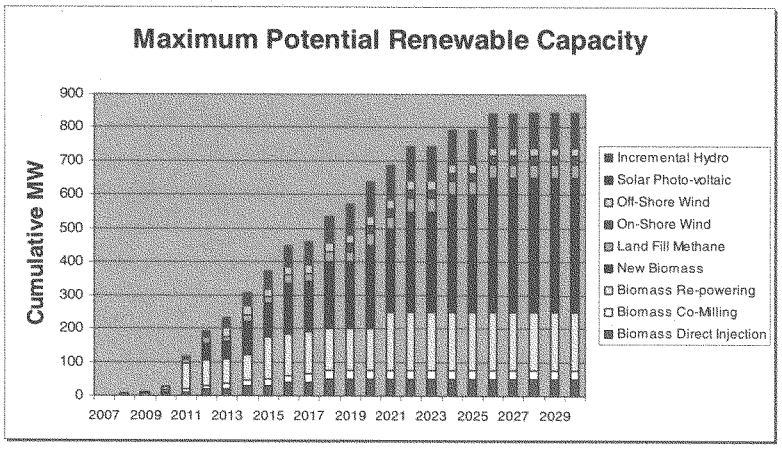


Fig. 6

Max. Potential Renewable Capacity for Southern Company vs. 15% Mandate

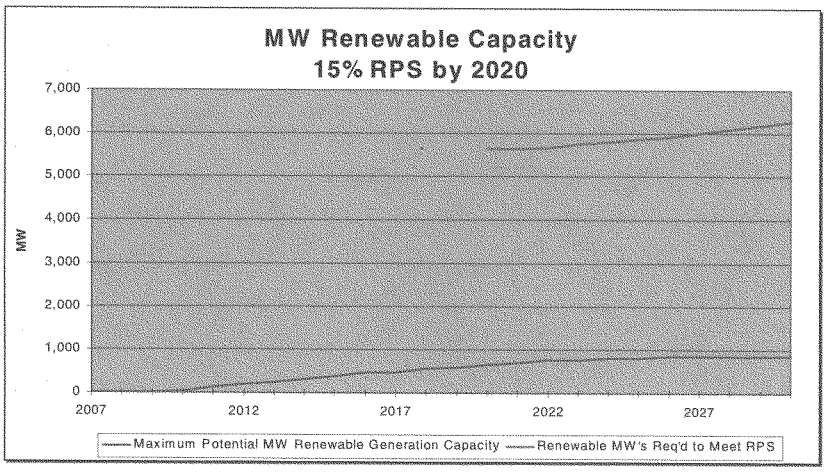


Fig. 7

Comparison of Eligible Resources in Bingaman RPS Proposal and Existing State RPS Mandates

This chart compares the eligible resources that qualify under the federal RPS amendment circulated by Chairman Bingaman in April 2007 which would mandate 15% renewables by 2020, and the existing RPS programs in 24 states and the District of Columbia.

	Wind	Solar	Biomass	Landfill Gas	Geothermal	Ocean, Tidal, Wave or Tidal	Hydro (small, qualifies as renewable)	Fuel cells (using renewable resources)	MSW or Waste Recovery	Biogas	Ocean Thermal	Wave, Tidal, Kinetic Energy	Biodiesel Plant fuel	Landfill Gas (eligible reservoirs)	Energy Efficiency	Clean Coal (eligible technology)	PA IRA OPT	Renewed Management	Demand Side Management	Efficiency Improvements	IGCC	Fuel cell(s)	Mine Methane	Farmers Manure	Municipal Solid Waste	Waste Coal	Waste Heat	Renewables Total	Total Eligible Resources Total	Net Differences (Adds or Subtracts)
Federal RPS	x	x	x	x	x	x	x																						7	-
AZ	x	x	x	x	x				x		x				x		x												9	+2
CA	x	x	x	x	x	x	x		x	x	x	x																	11	+4
CO	x	x	x	x	x		x		x				x		x	x										x			11	+4
CT	x	x	x	x		x	x		x	x		x			x	x				x	x					x			14	+7
DC	x	x	x	x	x	x	x		x	x		x	x																11	+4
DE	x	x	x	x	x	x	x		x		x																		9	+2
HI	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x			x					x	x			19	+12
IA	x	x	x				x			x								x											6	-1
MA	x	x	x	x		x	x		x		x	x		x															10	+3
MD	x	x	x	x	x	x	x		x	x	x		x	x															12	+5
ME	x	x	x	x	x	x	x		x							x		x	x		x							x	13	+8
MN	x		x				x		x																				4	-3
MT	x	x	x	x	x		x		x		x		x																10	+3
NH	x	x	x	x	x	x	x		x		x	x	x	x	x														13	+6
NJ	x	x	x	x	x	x	x		x	x	x			x	x														12	+5
NM	x	x	x	x	x		x		x		x																		8	+1
NV	x	x	x	x	x						x		x	x	x	x									x				11	+4
NY	x	x	x	x		x	x		x	x	x	x		x	x														12	+5
OR	x	x	x	x	x	x	x		x	x	x	x			x			x											14	+7
PA	x	x	x	x	x		x		x	x	x				x	x		x	x	x		x	x	x	x		x	x	20	+13
RI	x	x	x	x	x	x	x		x		x	x		x	x														12	+5
TX	x	x	x	x	x	x	x								x			x											9	+2
VT	x	x	x	x	x		x		x		x	x	x	x	x					x									12	+5
WA	x	x		x	x	x	x				x	x	x	x															9	+2
WI	x	x	x	x	x	x	x		x																				9	+1

Source: Edison Electric Institute (EEI)
As of 6/12/07

Fig. 8

Renewable Portfolio Standard

15 Percent @3 Cent/Kwh Price Cap
Cost to Southern Company

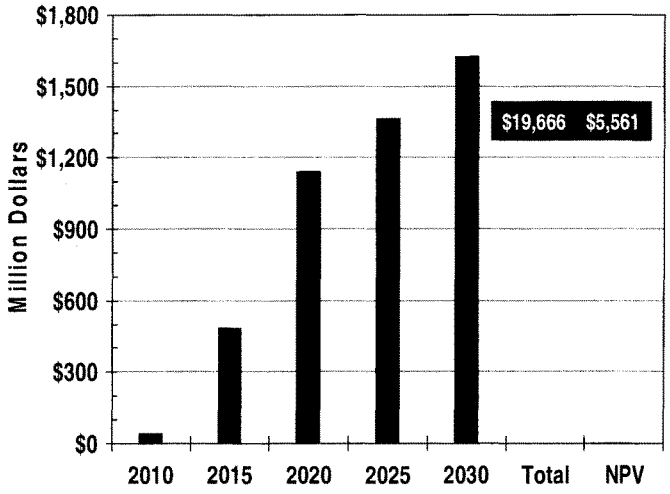


Fig. 9

The CHAIRMAN. Thank you, Mr. Hobson, very much. Our next witness is Mr. Bob Reedy. He is the Director of the Solar Energy Center. Before coming to the Florida Solar Energy Center. Mr. Reedy spent 23 years with the Department of Electric and Water Utilities with the City of Lakeland, Florida. Welcome, sir. Whenever you are ready, please begin.

STATEMENT OF BOB REEDY

Mr. REEDY. Thank you, Chairman Markey and Members of the Committee, certainly for the chance to present my views but more important, for the leadership and initiative taken in this critical area.

I would begin with a quote from a famous American. It goes like this. "I put my money on the sun and solar energy. What a source of power. I hope we don't have to wait until oil and coal run out before we tackle that." Well, that was Thomas Edison. That was in 1931, and Thomas Edison is easily considered the father of the utility industry, as in Consolidated Edison and Commonwealth Edison, names of major utilities.

The president's vision for the DOE's Solar America Initiative is changing the way we power our homes and businesses, with a goal for a cost competitive photovoltaic industry by 2015. The great strength of this vision lies in the forces behind our discussion here today. We are well on track to see this happen.

While I hail from the business of the sun, today I will speak more from the perspective of a utility. You heard that I have spent most of my career with utilities. Let's take a look at the critical characteristics of energy supply from a utility perspective, and although I speak of solar energy, I will acknowledge that many of these characteristics occur with other renewable technologies.

Consider risk. Ultimately, the generation decision is all about risk. Utilities are uniquely capital intensive, with very long payback periods inherent in their business model. So how can such inherently risky ventures as a large coal-fired steam plant or a combined-cycle gas turbine pass this risk criteria? These plants have many modes of mechanical failure, which I call technology risk. They face high risk of fuel shortages. They have large negative environmental impacts, which is a regulatory risk. And they present a technically unhealthy size, I call it technically unhealthy to the nation's grid. If you recall the blackout outages of August of 2003.

So the good news I bring, the renewable energy technologies will surely lower the risk even when evaluated on utility terms. So let's look at a few key elements of this risk profile. Economic feasibility is certainly first. U.S. Department of Energy cost projections show the cost of PV systems without, this is without financial incentives, decreasing from a present U.S. national average of 32 cents per kilowatt hour to a future of nine cents per kilowatt hour by 2020.

And solar water heating, which is a fairly mature technology, so it is likely to remain flat in its cost projections will come in less than 8 cents per kilowatt hour. Floridians now pay the utility about 12 cents a kilowatt hour. If one assumes that the cost of electricity from Florida utilities goes up by only three percent by year, in 2010 we will pay 13 and a half cents per kilowatt hour and by 2020, that will be 18 cents per kilowatt hour.

So if no incentives or subsidies in 2020, the energy generation systems on your roof and the energy efficiencies built into your home will cost half the utility rate. This is the customer perspective. The utility economies are proportionate. Nothing about the solar energy system on a residential rooftop precludes the utility from owning and operating the system under an easement agreement and enjoying the certain rate-basing capabilities of that system. So go green and have a guaranteed return.

One major frustration to the solar industry is our persistent habit of comparing the base rate, base load energy rate of average generation costs of conventional generation to the peak period production costs of solar energy. I even did it just in the paragraph above. In fact, utility generation costs during the daily summer peak, that's when PV production is the highest or about three times the annual generation cost.

In a recent analysis of Florida generation costs, the Solar Energy Center found the total amortized 30 year lifecycle cost of a new, simple cycle gas turbine peaking unit to be around $180 per megawatt hour.

The CHAIRMAN. If you could summarize your testimony.

Mr. REEDY. Yes, sir. And the equivalent PV investment was less than $110 per megawatt dollar. Solar systems are very reliable, predictable, and these are attributes highly valued by utility. They are highly available and we can discuss later the many ways that have not been realized to find solar resource.

[The statement of Mr. Reedy follows:]

Comments of
Bob Reedy, Director – Solar Energy Division
Florida Solar Energy Center

Before the
Select Committee on
Energy Independence and Global Warming

September 20, 2007

Vision

> "I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait 'til oil and coal run out before we tackle that."
>
> Thomas Edison, 1931.

Early in 2007, Congress began work on significant new legislation to boost our independence from foreign oil, and mitigate the climate effects from consumption of all fossil fuels.

Let's imagine a new vision of the future for the United States – one that is based on renewable energy production. The vision is relatively simple. You live in a highly efficient "zero energy home" that produces more power than it uses and you work in a building that produces more power than it uses. Your home and work place also have the capability of producing advanced renewable energy "carriers" that store energy with the excess power produced by the solar energy systems. You drive a plug-in hybrid vehicle that you can "plug into" multiple points on the electric grid with solar power generation capability (e.g. your parking lot at work). The "utility" company has the ability, through advanced communication and control systems, to identify and control both the energy carrier production and storage system devices and the charging and discharging of your plug-in hybrid. And most important, the utility itself is producing a major portion of its energy requirements from clean renewable resources such as centralized solar plants, wind farms and carbon-neutral biomass plants.

This vision is one of energy independence which salvages our energy security, protects us against terrorist attack and creates economic opportunities and jobs that can not be outsourced to other regions of the world. This vision is the United States leading the world in greenhouse gas reduction, while building a strong economy around developing, installing and servicing efficiency and green technologies rather than sending billions of dollars of hard-earned capital out of our country for the purchase of conventional fuels.

While this vision is already technically possible, some portions may not be economic today. However, we know from history that the economics will change dramatically with improvements in technology, increases in production volume and the catalytic shifts in public policy and perception presently afoot. For example, the President's Vision for the Department of Energy-funded Solar America Initiative is changing the way we power our homes and businesses. The goal of the Solar America Initiative is for photovoltaics to be cost-competitive by 2015. The great strength of this vision lies in the forces behind our discussion here today. We are well on track to see this happen!

Critical Characteristics of Energy Supply

Without regard to type, all energy resources must meet the needs of society. As stewards of these resources, energy companies further evaluate the technologies to meet the long-term needs of their owners (investors, municipal citizens, or cooperative members). Though I today represent the Florida Solar Energy Center, many years of work with electric utilities and energy marketers allows me a unique perspective on these generation expansion decisions. I will discuss solar energy in particular, but emphasize these attributes apply to other renewable technologies as well.

Risk

Ultimately, the generation expansion decision is all about Risk. Utilities are uniquely capital-intensive, with very long payback periods inherent in the model. This gives rise to the regulated monopolies, publicly-owned utilities and membership cooperatives which have served us well for decades. Even with such robust corporate structures, utilities are still at great risk when building new generation. Investors and stockholders seek considerable risk mitigation when lending such huge amounts of capital.

This said, we often wonder how such inherently risky ventures as a large coal-fired steam plant, or a combined-cycle gas turbine can pass the risk criteria. These plants suffer many modes of mechanical failure (technology risk), face high risk of fuel shortage, have large negative environmental impacts (regulatory risk) and present a "technically unhealthy" size to the nation's electric grid (operating risk).

Yet our electric grid is second to none, providing reliable service (in spite of some glitches) and economic (at least in direct costs) service since the turn of the last century. The technologies remain risky, but we have developed a complex set of coping mechanisms to mitigate those risks – from the basic monopolistic structures to a strong transmission grid, to a strong regulatory infrastructure.

Change to this complex set of mechanisms can itself be seen as a great risk. The old adage "don't fix what isn't broken" is often cited in the debate. However, our changing climate and our energy dependence are telling us in no uncertain terms: we must change. The good news is the shift to renewable energy technologies by our utilities will surely *lower* their risk profile, even when evaluated on utility terms. Let's examine some key elements of the overall risk profile.

Economic Feasibility

Instead of trying to generate our new electric energy requirements, consider the implementation of a very aggressive energy-efficiency program saving 30 to 50 percent of the energy used in buildings. This program would reduce the need for new generation by 25 percent while developing new industry and jobs. These savings require thought and effort, but the results have been proven. Studies conducted by the Florida Solar Energy Center using measured data from side-by-side homes show that a well-designed, energy-efficient home can save 60 percent of the energy it uses, and, by adding a 2- to 4-kilowatt PV system, the home can approach 90 percent savings. And these savings were achieved with an amortized cost of about $0.06 per kWh – about half the current average retail electric rate in Florida.

What about renewable energy production? Let's only look at photovoltaics for electric power generation, and solar water heating for direct displacement of electric generation needs. Recent calculations have shown the life cycle cost of photovoltaic applications in Florida is $0.28 per kWh. U.S. Department of Energy cost projections show the cost of a PV system without financial incentives decreasing from a present U. S. national average value of $0.32 per kWh to a future of $0.09 per kWh by 2020. Solar water heating technology is fairly mature, leading to the conclusion that today's life cycle cost of energy production will remain essentially flat at something less than $0.08 per kWh.

Floridians now pay the utility about $0.12 per kWh. If one assumes that the cost of electricity from Florida utilities goes up by only 3 percent per year, in 2010 we will pay $0.135 per kWh and by 2020, we will pay $0.18 per kWh. So with no incentives or subsidies, in 2020 the energy generation systems on your roof, *and* the energy efficiencies built into your home will cost half the utility rate!

This is the customer perspective—the utility view is proportionate, as it must be in a regulated monopoly. In other words, the utility can only charge a small percentage above delivered cost as a fair rate of return. Nothing about solar energy on a residential rooftop precludes the utility from owning and operating the system under an easement agreement. Surveys have consistently shown many homeowners would not object, and even prefer an energy company take responsibility for installing, operating and maintaining a solar system. Consider the popularity of lawn maintenance and home maintenance services. Certainly the multi-family and rental properties are prime for this plan, so long as the owner benefits from the easement.

Such distributed generation should absolutely qualify as necessary generation and distribution facilities in determination of rate base facilities. Go Green and earn a guaranteed return!

One major frustration to the solar industry is our persistent habit of comparing the "base load" average generation costs of conventional generation to the peak period production costs of solar energy. (Even I have done this in the paragraphs above) In fact, the utility generation costs during the daily summer peak (when PV production is highest) are about three times the annual average generation cost.

In a recent analysis of Florida generation costs, FSEC found the total amortized 30 year life-cycle cost of a new simple-cycle gas turbine peaking unit to be around $180 per megawatthour, while an equivalent utility-scale PV investment would cost less than $110 per megawatthour on the same terms and assumptions.

Reliability

Solar systems are far and away the most reliable generation technologies available. The solid-state PV panels will operate for 20 or even 40 years without significant degradation, and even the circulating pump of an active solar water heater is built with 20 years as the standard.

Compared to utility generators with fuel systems, turbines and all the controls between, these solar systems are "like a rock". Another impressive reliability gain comes from the incremental nature of an aggregate of small solar systems. The utility often loses a complete block of several hundred megawatts when a generating unit suddenly trips offline (or thousands of megawatts with loss on an entire plant). An equivalent event with PV generation would require the coincident failure of thousands of rooftop systems.

Solar systems are technically "intermittent" because the sun sets every day, and dense storm clouds can reduce output. But utilities highly value the predictability of solar system production. Given their already extensive weather modeling capabilities, utilities can accurately estimate production next hour, next day and even into the annual realm.

Availability

Obviously, there is no lack of solar energy. Even in the far north or in cloudy regions, we have ample solar resource. Conversion of the available energy is the challenge, with the necessary infrastructure for mounting collectors as the particular problem. Desert regions with large "solar farms" come to the public mind, but a tremendous amount of otherwise unused space is available everywhere. In fact the solar farm

is actually disadvantaged over distributed rooftop systems because it is really a central-station power plant, with the resulting requirements, losses and problems of electric transmission and distribution. Consider some of the opportunities:

- Joint usage of suitable roof space in cooperation with, and to the economic advantage of the building owner. This allows for 25kW to be installed where a homeowner may only need and want 5kW.
- Linear arrays along the median of divided highways, coincident with existing crash barriers, and along the edges of the right of way outside any safety zone, and integrated into sound barrier structures.
- Ground mounted arrays in the perimeter zones of airports
- Linear arrays along the edges of suitable stretches of transmission line rights of way

Such new configurations are not necessary for a significant contribution by solar energy. FSEC has recently estimated sufficient roof space to provide 2% of Florida's electric energy needs with PV generation, and 2% electric generation offsets from solar thermal generation (hot water). And this is achievable with very reasonable changes in practice and policy, all at a net savings (monthly cost of energy plus mortgage) to the homeowner. The newer deployment techniques described above would bring at least 10% of our electric energy needs while remaining economic (less than 1% increase in total generation costs).

Certainly, the roofs of every school building in America should be covered with solar panels!

Air conditioning is a huge electric system demand throughout the Sunbelt. One of the most promising opportunities for solar energy lies with solar-driven absorption chilling. The basic technology is decades old, but has relied on fossil-fired boilers with resulting high fuel costs, maintenance problems, and environmental impacts. New computer-controlled solar-assisted absorption chillers could mitigate or eliminate these problems.

Economic Impact of Creating New Industries and Jobs

We often discuss the obvious economic advantages of renewable energy supply: keep our dollars at home, control risk and the shifts from speculation and shortages, and prevent costly spills and accidents. We have even begun to understand and quantify the fossil-fueled externalities of environmental costs, health care and social dislocation. But the newest excitement of the Green Economy is about jobs and investment opportunity.

The U.S. PV industry has been growing at a rate of 40% per year (increasing from 108 Megawatts in 2005 to 141 Megawatts in 2006 and to 259 in 2007). The 2007 increase is projected to be 83% because the U. S. market is expected to dominate the world PV market over the next four years. The states with major PV market are California, New Jersey, New York, Arizona and Texas. (Florida has a better solar resource than any of these states except Arizona and has double the solar resource of the world's largest PV market – Germany). The industry surveys and U. S. Department of Energy data indicate that this double-digit growth is expected to continue in the upcoming years.

The Opportunity

Sunlight provides by far the largest of all carbon-neutral energy sources. More energy from sunlight strikes the Earth in one hour than all the energy consumed on the planet in a year. The most successful renewable technologies taking advantage of this resource are the direct conversion systems of

photovoltaics (PV) and solar thermal energy (particularly domestic water heating). The earliest engines of the industrial revolution driven by wind and hydroelectric turbines and biomass boilers – are actually indirect solar energy conversion systems.

Yet, in spite of the vast potential, photovoltaics currently provides only about one-millionth of world total electricity supply. The huge gap between our present use of PV and its enormous undeveloped potential presents a grand challenge in public policy. As Edison suggested in 1931, sunlight is a compelling solution to our need for clean, abundant sources of energy. It is readily available, secure from geopolitical tension, and its use poses no threat to the environment or climate through pollution or emission of greenhouse gases.

Worldwide demand for energy is outpacing supply. A large number of energy experts claim that we have reached the world's oil peak – the peak of the annual production of the crude oil. During the "energy crisis" of 1973, our country imported less than half of its oil consumption. Today we import 60 percent. These and other factors underlie our vulnerability to energy supply.

It is time for the nation to act.

The CHAIRMAN. Thank you, sir. I appreciate it. Our next witness is Dave Foster. He currently serves as the Executive Director of the Blue Green Alliance, a partnership between the United Steelworkers and the Sierra Club. Previously, he was the Director of the United Steelworkers District No. 11 region in the Midwest and we thank you, sir, for being here. Whenever you are ready, please begin.

STATEMENT OF DAVE FOSTER

Mr. FOSTER. Thank you, Mr. Chairman, and Members of the Committee. One of the most famous American industrialists of the 20th century, Henry J. Kaiser, who built an innovative manufacturing enterprise that included aluminum, steel, and shipbuilding and created the health care delivery system that still bares his name, once observed that "problems are just opportunities in work clothes."

Solving global warming need not be the economic calamity that some are predicting. It's our view, in fact, that solutions to global warming, like Renewable Energy Standards will be the most important economic development tools of the 21st Century.

Evidence of that fact already surrounds us. In Germany, 1.4 million people are already employed in the environmental sector and 40,000 people are employed in their wind energy industry that in a country that has only 20 percent of the wind resource of my home State of Minnesota.

Economic studies that the Steelworkers have supported over the past decade have shown repeatedly that well-crafted public policies that move as steadily and predictably toward global warming emission reductions will have a net positive impact on jobs including in manufacturing.

A 2002 study produced by the Center for Sustainable Economies and the Economic Policy Institute showed, for instance, that a menu of renewable energy investments, efficiency measures, and carbon reduction mandates in line with the Kyoto targets would have created a net increase of 1.4 million jobs in our economy including increases in most manufacturing industries.

And when these policies are accompanied with a modest order adjustment fee to ensure that the increase in energy costs in the U.S. does not simply result in an export of American manufacturing to environmentally unregulated parts of the world, we have the policy tools to rebuild America's manufacturing infrastructure.

Another study of component manufacturing in the renewable energy industry based on the rough equivalent of the 20 percent RES found that 850,000 jobs would be created with $160 billion of investment in manufacturing. This investment would ripple through 43,000 firms and revitalize the 20 states hardest hit by the decline in manufacturing in the last decade.

Nothing, however, is quite as convincing as actually seeing the economic activity generated by the passage of Renewable Energy Standards in the states. In 2004, Pennsylvania passed its 18 percent RES and as a result, Gamesa, the Spanish wind turbine company selected the certainty of the market demand in Pennsylvania created by that RES to build its first North American plants.

Today, almost a thousand steelworkers are employed by Gamesa outside of Philadelphia making wind turbines on the site of an abandoned U.S. steel mill. The company's products are sold out through 2009.

Currently, in response to state energy standards new wind turbine equipment plants have been built in six communities in my part of the country, North Dakota, Minnesota, and Iowa, directly employing over 2200 people. One of these companies, LM Glasfiber, recently announced its agreement to build an additional plant in Little Rock, Arkansas, employing another 1,000 people and another DMI announced a new power plant in Tulsa, Oklahoma, employing at least 450.

Wind turbine installation is also creating jobs and bringing economic benefits to rural America. Mortenson Construction, based in Minnesota, and one of North America's largest installers, now does 25 percent of its business in wind. Mortenson installs about 2,000 megawatts per year, employing almost a thousand construction workers in 16 sites around the country. The company also reports that on an average 100 megawatt project, it spends between $15 and $20 million within a 75–mile radius thus bolstering local economies.

The State of Minnesota has also calculated the value of wind energy production to rural and farm income, demonstrating that after initial capital costs of $1 to $2 million have been recovered, farm profits from renewable energy sales can rise to as much as $100,000 per year.

Now some might argue that in the face of growing evidence that renewable energy is now cost competitive with many forms of fossil fuel-derived energy, the government should simply get out of the way and allow the market to work its wonders. That approach would, I fear, draw exactly the wrong lesson from the years of involvement of the state level in crafting these Renewable Energy Standards. These laws are precisely what provided enough market certainty to allow market forces to perform their function.

In the Twin Cities of Minnesota, I co-chair with the Mayors of Minneapolis and St. Paul the New Green Manufacturing Initiative, a wide-ranging task force guided by the principle that investments in solving critical environmental challenges such as global warming represents strategic economic opportunities.

The GMI has brought together over 100 representatives from Xcel Energy to the Sierra Club from the Minneapolis-St. Paul Chambers of Commerce to the construction trades unions from the investment community to state government, all with an eye to informing our mayors on how to capture the value of these new opportunities and make their cities world renown for the research and commercialization of renewable energy and efficiency processes, equipment and systems.

Economic transformations in our society have always bred winners and losers. It's an inescapable fact that when Henry Ford began to mass produce automobiles, the blacksmiths of the 19th century were replaced by the United Auto Workers of the 20th. But the America that emerged from that transformation was richer and fairer because of the courage of government to manage it properly.

We can have the same outcome with the transformation to a clean energy economy if we choose to do likewise.

Thank you.

[The statement of Mr. Foster follows:]

Testimony of
Dave Foster
Executive Director
Blue Green Alliance
Before the Select Committee on Energy Independence and Global Warming
Hearing on
"Renewable Electricity Standards Lighting the Way"
September 20, 2007

Mr. Chairman, Members of the Committee, My name is David Foster. Currently, I serve as the Executive Director of the Blue Green Alliance, a public policy partnership of the United Steelworkers (USW), North America's largest manufacturing union with 850,000 members and the Sierra Club, our nation's largest and oldest, grassroots' environmental organization with 1.3 million members and supporters.

Before serving in this capacity I spent 31 years as a member of the United Steelworkers and for 16 years served on the union's International Executive Board as the Director of District 11, a 13-state region based in Minnesota.

I am especially pleased to be given the opportunity to testify before the House Select Committee on Energy Independence and Global Warming, an issue that our union identified as the most pressing environmental challenge facing the country 17 years ago in 1990.

But to the two important issues of energy independence and global warming, I would add a third—economic opportunity. I would add economic opportunity because it is the understanding that today's environmental challenges are tomorrow's economic opportunities that drives the interest of the United Steelworkers and Sierra Club in fashioning a shared vision for the 21st Century.

One of the most famous American industrialists of the 20th Century, Henry J. Kaiser, who built an innovative manufacturing enterprise that included aluminum, steel, and ship building and created the health care delivery system that still bears his name, once observed that "Problems are just opportunities in work clothes."

The entrepreneurial and 'can-do' spirit that characterized a company that built a ship a day in its Oakland shipyards during World War II and responded to President John Kennedy's call for an Alliance for Peace by building Africa's first aluminum smelter in Ghana in the early 1960's, is absolutely essential when we describe the new green, clean energy economy that we are striving to build.

Solving global warming need not be the economic calamity that some are predicting. In fact, global warming along with other environmental challenges such as transitioning to a green chemicals industry and removing toxics from our work places and communities will be the most important economic development tools of the 21st Century.

Evidence of that fact already surrounds us. In Germany, 1.4 million people are already employed in the environmental sector. And 40,000 people are employed in their wind energy industry in a country that has only 20 percent of the wind resource of my home state of Minnesota. And interestingly, more steel is consumed in Germany by the wind energy industry than any other save automotive.

Economic studies that the USW has supported over the past decade have shown repeatedly that well-crafted public policies that move us steadily and predictably toward global warming emissions reductions will have a net positive impact including in manufacturing. A 2002 study produced by the Center for Sustainable Economies and the Economic Policy Institute and released by the United Steelworkers and other unions showed that a menu of renewable energy investments, efficiency measures and carbon reduction mandates in line with the Kyoto targets would have created a net increase of 1.4 million jobs in the economy, including increases in most manufacturing industries. And when those policies are accompanied with a modest border adjustment fee, to ensure that the increase in energy costs in the U.S. does not simply result in an export of American manufacturing to environmentally unregulated parts of the world, we have the policy tools to rebuild America's manufacturing infrastructure.

Earlier this year, the Union of Concerned Scientists released a study indicating that the 20 percent RES of the proposed Udall-Platts bill would create a net 185,000 jobs. This study further showed that renewable investments tend to produce three times as many jobs as fossil fuel investments for similar amounts of energy production.

However, a study released in 2006 by the Blue Green Alliance of component manufacturing in the renewable energy industry based on a 10 year effort to introduce 185,000 megawatts of renewables—the rough equivalent of a 20 percent RES—found that 850,000 jobs would be created with $160 billion of investments in manufacturing. This investment would ripple through 43,000 firms and revitalize the 20 states hardest hit by the decline in manufacturing in the last decade. The difference between these two studies can be attributed to direct measurement of the economic impact of the investment in renewables versus measurement of the net impacts on jobs of changing energy reliance.

Economic models for the state of Minnesota show that a federal RES at 20 percent would generate over 18,000 jobs in renewable component manufacturing, while Ohio would create 51,000; Michigan, 34,000; and Wisconsin, 37,000.

The State of Minnesota also markets the value of wind energy production to rural and farm income, demonstrating that after initial capital costs of $1-2 million have been recovered, farm profits from renewable energy sales can rise to $100,000 per year.

Nothing, however, is quite as convincing as actually seeing the economic activity generated in America's heartland by the passage of renewable energy standards in states across the nation. In 2004 Pennsylvania passed its 18 percent RES while my own state legislature debated the wisdom of mandates. As a result Gamesa, the Spanish wind turbine company, selected the certainty of the market demand in PA created by the RES to build its first North American plants. Today almost 1000 steelworkers are employed in Gamesa plants outside of

Philadelphia making wind turbines on the site of an abandoned U.S. Steel mill. The company's products are sold out through 2009.

Over the years that I testified in support of passage of an RES in MN, I watched while what had started as a seemingly quixotic environmental cause shifted into a popular economic development strategy. In 2007 when MN passed the nation's most aggressive RES at 25 percent by 2020 with broad bi-partisan support, committee testimony was almost exclusively about the job creating and economic benefits of renewables.

Currently, new wind turbine equipment plants have been built in six communities in ND, MN and IA in the last decade directly employing over 2200 people.

- ND LM Glasfiber, Grand Forks, 950 ee's
- ND DMI, West Fargo, 340 ee's (Discover Manufacturing Innovation)
- MN Suzlon, Pipestone, 275 ee's
- IA Clipper Industries, Cedar Rapids, 200 ee's
- IA Siemens, Fort Madison, 250 ee's
- IA Acciona, West Branch, 110 ee's

One of these companies LM Glasfiber of Denmark recently announced its agreement to build an additional plant in Little Rock employing 1000 people. And another DMI of North Dakota announced a new tower plant in Tulsa, OK employing at least 450.

This, of course, says nothing about the numbers of people also employed in component parts manufacturing, installation of turbines, their maintenance, and the construction of new transmission lines. Local officials of the IBEW in MN tell me that their members are involved in more transmission work than ever in their lifetimes as Xcel Energy spends $160 million on transmission upgrades to bring new wind capacity from western MN. One local machine shop is struggling to avoid becoming overly dependent on the wind energy sector of its business.

Wind turbine installation is also creating jobs and bringing economic benefits to rural America. Mortenson Construction, based in Minnesota and one of North America's largest installers, now does 25 per cent of its business in wind. Mortenson installs about 2000 megawatts of wind per year, employing between 900-1000 construction workers on 15-16 sites around the country, in addition to 230 salaried employees. The company reported that, on an average 100 megawatt installation project, it spends between $15-20 million within a 75 mile radius, thus bolstering local economies.

And just this last summer Arcelor Mittal Steel, the world's largest steel company and largest in the U.S., called back 250 steelworkers to its Burns Harbor, MI plate mill because of the demand for steel in wind turbine towers.

The state of Iowa Department of Economic Development has made renewables the centerpiece of its economic development strategy and projects that its Upper Midwest market of 11 states will add almost 8000 megawatts of wind by 2012. Clipper Industries one of Iowa's turbine manufacturers projects global growth in the wind industry of 15 to 25 percent per year for the next five years.

I could continue for some time with anecdotal evidence of the growing clean energy economy that is creating thousands of new jobs while providing a significant new source of income to rural America through land lease and investment opportunities.

But I want to devote just a moment to reflecting on the importance of public policy to shaping market forces in our country. Some might argue that, in the face of growing evidence that renewable energy is now cost competitive with many forms of fossil fuel-derived energy, that government should simply get out of the way and allow the market to work its wonders. That approach would, I fear, draw exactly the wrong lesson from the years of involvement at the state level in crafting renewable energy standards.

These laws provided enough market certainty to allow market forces to perform their function. Our history is full of many other examples where public policy recognition of the importance of greater social benefits provided the necessary guidance to jump start market activities—our national system of railroads, rural electrification, monopoly regulation, securities regulation, and so forth.

In the Twin Cities of Minnesota, I co-chair with the Mayors of Minneapolis and St. Paul, the new Green Manufacturing Initiative (GMI), a wide-ranging task force guided by the principle that "investments in solving critical environmental challenges such as global warming represent strategic economic opportunities." The GMI has brought together over 100 representatives ranging from XCEL Energy to the Sierra Club, from the Minneapolis and St. Paul Chambers of Commerce to the construction trades' unions, from the investment community to state government—all with an eye to informing our Mayors on how to capture the value of these new opportunities and make their cities world-renowned for the research and commercialization of renewable energy and efficiency processes, equipment, and systems.

We are doing this because we recognize that responding to an overriding social imperative—solve global warming—doesn't have to result in economic dislocation. In fact, it can perform just the opposite function.

The United Steelworkers and the Sierra Club, unlikely partners to many, have been stirred by this common vision to take our message from union halls on the Iron Range of Minnesota's mining district to the oil refineries where our members work in Houston, from policy debates in dozens of state capitals to planning conferences and International gatherings of NGO's and the United Nations.

Economic transformations in our society have always bred winners and losers. It's an inescapable fact that when Henry Ford began to mass produce automobiles the blacksmiths of the 19th Century were replaced by the United Autoworkers of the 20th. But the America that emerged from that transformation was richer and fairer because of the courage of government to manage it properly. We can have the same outcome with the transformation to a clean energy economy if we choose to do likewise. And that's the work of our Blue Green Alliance.

Thank you for the opportunity to share my views.

The CHAIRMAN. Thank you, Mr. Foster, very much.

The Chair will now recognize himself for a round of questions.

Let me begin with you, Ms. Floyd. You say you have a biomass company, is it, in Mississippi?

Ms. FLOYD. No, it's not a biomass company. It's actually something, an advanced metering company. But I spend a lot of time in the state.

The CHAIRMAN. I see, I see. Well, let me go back to you then Mr. Hobson. You have testified that no mater how hard that your company works at this, you're not going to be able to squeeze more than 850 megawatts of renewables out of your region which would appear to be less than five percent that would constitute renewables.

Meanwhile, the Department of Energy has looked at this and estimates that the Southeast region can meet its entire 15 percent renewable requirement through 2020 without having a single credit from either another utility or from the government and that would come largely from biomass. How do you respond to the Department of Energy's study on that issue?

Mr. HOBSON. Mr. Chairman, we are excited about the prospects for biomass in the region. But we are also realistic about its limitations.

I'm not sure there is a full appreciation. I'm not familiar with the particulars of that study, but I'm not sure that there is an appreciation for the amount of renewable resources, biomass, that is required to fuel a power plant or power plants capable of providing the energy resources of the Southeast.

Our studies indicate that if you take a look at power plant locations and you draw circles around how much of the—how much of the biomass resources are required to fuel that plant, it's a very small number of plants that can be built.

We have looked at biomass plants in terms of sort of 50 megawatts, if you will, 50 megawatt plant sizes and it is clear to us that the number of plants that can actually be sited in the Southeast and supplied with the resources to provide that electricity is small.

The CHAIRMAN. Could you supply to the Committee the analysis that the Southern Company has done that demonstrates that your region's resources limit you to producing so much less than what the EIA and other studies indicate that you can and could you take the EIA study and tell us where the Bush Administration is wrong in their analysis of your region.

Mr. HOBSON. Sure.

The CHAIRMAN. Then we can share that with the Bush Administration as well.

Mr. Foster, could you—let me come over here for a second, Ms. Floyd, he's pessimistic. Tell us about wind in the Southeast. Tell us about wind in Mississippi. Tell us about wind in other regions of the country other than the West?

Ms. FLOYD. Other than the West?

The CHAIRMAN. Yes.

Ms. FLOYD. Obviously, there's good wind resource in the Northeast. In the South, wind is limited because the good wind regimes are on protected properties such as in Appalachian Mountains.

I mean one thing that has not been addressed is offshore wind and you know certainly in Europe where they are more advanced in off-shore wind, that is very much a possibility because in the Southeast you have very shallow waters for quite a distance and offshore wind is very much a possibility.

The CHAIRMAN. So if we had a national scheme for wind development offshore, that could offer significant potential for the Southeast?

Ms. FLOYD. That could offer significant potential, yes.

The CHAIRMAN. Do you agree with that, Mr. Hobson?

Mr. HOBSON. No, I don't, Mr. Chairman, and the reason is that the Southeast has a unique characteristic to it that the rest of the country or the rest of the world might not, and that is it sits in the pathway of major storms that come in the form of hurricanes and wind turbines are not able to withstand even a very small Class 3 hurricane. And so putting resources, huge investments in the Gulf Region or even in the South Atlantic would be a huge risk. We have done work at Georgia Tech to look at offshore wind off the coast of Georgia, and the wind, the availability of wind offshore is better than on shore, but it is not good enough to offset the additional cost required to build offshore.

The CHAIRMAN. Okay, and on the issue of Florida being the Sunshine State, meaning that a huge percentage of the population from Massachusetts and New York and New Jersey have moved down there based upon that advertising? You're saying to us that it's really a very cloudy state and it's not good for solar and that perhaps it should be renamed the Cloudy State, not the Sunshine State?

It seems to run contrary to the misimpression that people in the colder, cloudier parts of the country have about your state, sir.

Mr. HOBSON. Mr. Chairman, I think that there are, Governor Crist reminded us during his global climate forum that Florida is indeed the Sunshine State. I think that based on what I know about solar in Florida, there are probably areas in Florida where solar would be a real option. But I think even for Florida to think that solar is an option for the entire state, because it is a very geographically diverse state, I think a lot of work would have to be done to make the leap that Florida can be the sunshine state in terms of solar generation.

The CHAIRMAN. My time has expired. I will now recognize the gentleman from Oregon, Mr. Blumenauer.

Mr. BLUMENAUER. With your permission, Mr. Chairman, I would just like to take up where you left off and I would like to engage Ms. Floyd, Mr. Foster in a conversation with Mr. Hobson, because I was struck, Mr. Foster, with your vision of this being a comprehensive approach to be able to deal with technology, to be able to put people to work onsite and with a variety of technologies.

Ms. Floyd, you had referenced, for instance, a photovoltaic operation that was located in Germany to take advantage of the opportunities there. And I just, with all due respect, Mr. Hobson, I know that you are the expert with your company for environment and alternative energy and you supplied us with a chart in your testimony about solar intensity as to why solar doesn't work in your service area.

I wonder what the solar intensity map would look like for Germany, which has four, five times the application. I mean, Ms. Floyd, can you help Mr. Hobson with a different alternative and Mr. Foster and then Mr. Hobson if you would just respond, because it just seems to me we have this conversation and I was stunned with some of the people who have taken the material from your company, arguing against renewable portfolio standard that it would devastate Florida and other states and it just struck me as a little bizarre and maybe Ms. Floyd, could you help us with an alternative for Mr. Hobson?

Ms. FLOYD. Well, certainly Germany does not have terrific solar insulation or whatever the term is for measuring solar intensity and they have built a very large industry, I think growing very rapidly in the last couple of years.

If you look at the solar resource map, you know, I think the Southeast compares very much to Oregon and Washington. I can tell you that with new technology and in investment capital, entrepreneurs are going out and building large scale solar in rural areas, so benefitting rural areas, with much more efficient solar technology. Obviously it has to be efficient, because you can't get project financing for plants that are not efficient. So building large projects in areas that have the same solar intensity that most of the Southeast has.

Mr. BLUMENAUER. Thank you. Mr. Foster?

Mr. FOSTER. Yes, thank you. Mr. Chairman, my home State of Minnesota also has a significant forestry and pulp and paper industry similar to the Southeast. Currently, Minnesota is operating at least three biomass electric generation facilities and interestingly, the creation of one of those facilities resulted in the importation and establishment of a new biomass pelletizing plant that draws a source of fiber, the poplar in Northern Minnesota, a very quick growing tree.

Now that those pellets supply the Virginia and Minnesota biomass plant, that facility has expanded and is shipping 60,000 tons of biomass pellets a year through the Great Lakes to Spain, where there is a clear market for biomass feedstock for electric generation. So it seems to me that there is a clear roadmap for a RES producing exactly the kind of market that would make widespread use of the biomass resources of the rest of the country available for electric power generation and that story is the case in point.

Mr. BLUMENAUER. Mr. Hobson, does the observations about Germany and Minnesota, which would seem to be at least on a par with the southeastern region, is there anything here or is it just that it's just so far off the charts that that's something that isn't possible for your company?

Mr. HOBSON. You know, I don't want to give the Committee the impression that the Southern Company thinks that there are no opportunities for these renewable resources in the southeast. Certainly, there are opportunities. We see a lot of solar applications in the southeast, primarily on the end use of electricity which we think is a great application.

What we're talking about here is for the generation of electricity. I don't have the luxury of investing in resources that will supply me power for a small percentage of the time and hope that that

source of energy will be available when I need it. We have an obligation to serve our customers 24 hours a day, 365 days a year. So we have to know that the energy will be there when we need it. If I need solar and it's not available, my customers are going to suffer. If I need wind and the wind is not blowing, my customers are going to suffer.

Renewable resources have some very real opportunities to help us in niche situations and on the margins. But when you're talking about supplying electric power to a broad base of customers, you have real demands every day of the year. You have to have energy sources that you can rely on 24 hours a day, seven days a week.

Mr. BLUMENAUER. Thank you, Mr. Hobson. Thank you, Mr. Chairman. I just am struck that there are other parts of the world and other parts of the country who face exactly the same challenges in terms of predictability, reliability, that are being able to have the vision to come to scale, have the ingenuity, to be able to put these partnerships in place. I hope that your Governor Crist is able to persuade you that Florida and the southeast is capable of the same ingenuity, the same sort of creativity, the same sort of investment to be able to make it happen there and that's as it is happening in the rest of the country, and sadly in the rest of the world ahead of us.

The CHAIRMAN. The gentleman's time has expired. There is one roll call on the House floor. Motion to adjourn. The Chair intends on continuing the hearing. So if the Members would like to go over to make the roll call, the Chair will be here when you come back to be able to recognize you, but I now recognize the gentleman from Kansas, I mean from Missouri, from Kansas City, Mr. Cleaver, for his round of questions.

Mr. CLEAVER. Thank you, Mr. Chairman. There is the most potential for wind energy in the center of the country. I was on a radio show last week and made the statement that we didn't have the wind potential of some of the surrounding states, and the interviewer asked me if the people in Nebraska were stealing our wind and the bad part was that he was serious.

We have this issue in terms of the potential in the Great Plains and in the Northeast. Solar energy has apparently the best potential in the Southwest. Missouri has good wind potential, but in the northwest area of the state just to the north of Kansas City. But not all of the state, the southeastern states and Members have expressed concern over the possibility of reaching a national RPS because of the lack of potential for such energy.

So only a few states in the Southeast have adapted a state RPS. What is the potential? What are the problems with regard to some areas having wind potential, some not, in us passing a national RPS? Anyone? I mean, what are our challenges?

Mr. SLOAN. One of the challenges is infrastructure. I think the debate about a Renewable Energy Standard, a lot of times focuses on where is the energy going to be produced instead of where is the energy going to be used. If you look at other resources, be it coal or nuclear or oil or gas, there's a very limited number of states that most of those resources are produced in, and then they are moved to areas where they are used. And actually, there's a great example from Joplin, Missouri, Empire District. In your state, it is actually

one of the top users of wind energy in the country. It is importing wind from Kansas, but it benefits its rate payers by being able to lower the electric costs because they are able to reduce natural gas costs.

So part of it is just to sort of, not necessarily reframe. It's important where it is produced, but it is almost so important the benefits of using it and that will require infrastructure. I suspect over time it will be very much like you see with oil and gas and coal and uranium. It is going to be produced in the best areas predominately and then it will require infrastructure to move to the areas that want to use it.

Mr. CLEAVER. All right, thank you.

The CHAIRMAN. The chair recognizes—does the gentleman yield back the balance of his time?

The chair recognizes the gentlelady from South Dakota.

Ms. SANDLIN. Thank you, Mr. Chairman. I want to thank all of you for being here today. As I came into the hearing I heard a number of states in my region mentioned, but not my State of South Dakota. And I think there's a consensus brewing that South Dakota has one of the richest wind resources in the country, and we do have to get down to the vote. So I just wanted to share a comment that I think while state RESs like Minnesota's, Colorado's, and I believe Montana recently passed one, are very important as it relates to the community-based energy development that certainly Minnesota has benefitted and the consumers and citizens of South Dakota could as well and I'm working with my colleagues in the State Legislature back home to talk about the importance of that policy change, if it's on the horizon in South Dakota. But in addition to the Renewable Electricity Standard that we hope makes its may into the Conference Report for the Energy Bill that we include in the House version, I do think that we have to consider other changes and investments in the electricity grid, access to the WAPA grid, when there is room on that grid, so that we can in addition to the resources available in other regions of the country and in the South, we can get those wind resources, east and west, and in every direction.

And so I thank you for the work that you're already doing for the important testimony you've provided here today about what's happening in different states and different regions and we hope that within just a few years we can be sharing our rich resources as well as using it locally in the State of South Dakota.

So Mr. Chairman, thank you very much and I thank the witnesses for their testimony as well as the benefits to rural America of this important resource and being a solution to the nation's energy problems. Thank you.

The CHAIRMAN. The gentlelady's time has expired. They've added two additional roll calls out on the House Floor, so we're going to take a 15 minute recess and then we'll reconvene the Committee some time between 5 past and 10 past 11.

(Off the record.)

The CHAIRMAN. I apologize to our witnesses. The roll call took an additional 15 minutes that had not been anticipated.

Let me ask Ms. Floyd, in terms of wind potential, there are stories that there could be upwards of 4,000 new megawatts added this year to the national grid. Do you agree with that number?

Ms. FLOYD. I just want to remind the Chairman that I am—I was a wind developer in the early '80s and I now invest in a very broad range of technologies. So I probably don't have those statistics at hand. I did mention in my testimony that in the State of Washington last year they added a thousand megawatts so certainly I think that's in the ballpark.

The CHAIRMAN. What is Texas going to add this year?

Mr. SLOAN. Just this year, 2000 megwatts, about $3 billion worth of wind farms.

The CHAIRMAN. So Washington State was 1000. Texas is 2000. There were only 11,000 megawatts of natural gas added last year to the whole national grid. Only 600 megawatts of coal, no nuclear, and no oil. So what do you think is reasonable then, Ms. Sloan? What could we expect from Texas this year? Did you say 2000 megawatts?

Mr. SLOAN. Approximately 2000 megawatts this year, similar numbers are certainly available going into the future. A key limitation is going to be infrastructure. There is more investor interest. There's literally 40,000 megawatts of wind projects that are evaluating interconnection to the system.

The CHAIRMAN. Right now?

Mr. SLOAN. Right now.

The CHAIRMAN. So there could be upwards of 5,000 megawatts a year being added in 2012 if the interconnection transmission issues are resolved.

Mr. SLOAN. If the country were to get very serious about accommodating those resources, that the market wants to add, it could be very high numbers.

The CHAIRMAN. The interesting thing about that is the nuclear industry after 50 years has 100,000 megawatts and they haven't added any new megawatts in a generation. So here comes winds adding upwards of 4000 this year and that's nationally, but that seems like a conservative estimate, given what we're hearing about Washington State and Texas, that the nation might average 8000 or 10,000 megawatts a year being added in another five years and at that pace within 10 years, it would match the nuclear industry. It doesn't have the same ability to produce it on a regular basis, but that's quite a story.

Mr. SLOAN. If I can, there's the capability, I think, of the industry to gear up to do that, but the two key challenges will be infrastructure and you have to proactively look ahead. You will need the transmission lines to get from those windy areas to markets where people can use it. And also, is the supply chain, if you will. You know manufacturing the wind turbines and components which has been pointed out is not done very much today in the United States, but if the country were to get very serious with an RES, you would see, I think, an enormous investment in manufacturing of those components.

The CHAIRMAN. Yes, Ms. Floyd.

Ms. FLOYD. And could I just add a point on infrastructure. One of the areas that we're investing in is quote unquote Smart Grid.

And whether we like it or not, this country is going to have to invest in the infrastructure. For the last two decades, the amount of investment in the grid has declined dramatically and so just from a reliability standpoint, never mind being able to handle this additional wind generation and other distributed generation, there is going to have to be an investment and an upgrade in that infrastructure to provide the kind of reliability that customers demand.

The CHAIRMAN. Now, wind, as a result has a chance to really make a big difference in terms of what our national needs will be for new electrical generation between now and the year 2030. If you project, let's just say it's 5,000 a year, for 23 years, you have 115,000 megawatts by 2030 and nuclear only has 100,000 today. But if you make it 10,000 per year, it really picks up nationally now. Texas at 2000 is at the dawn of the era, you're saying almost, so Texas might start adding even more per year and so you do have this real likelihood that there could be upwards of 200,000 megawatts of wind in the United States by the Year 2030.

Is that realistic? Is that possible, if we make the right transmission decisions? Is there a limitation on how much wind we can produce?

Mr. SLOAN. I will say there certainly is a limitation, but we will not reach it for a long time. If you look at the potential of wind, it is virtually unlimited. Just in the State of Texas, we literally have sufficient sites to support 500,000 megawatts of wind and the good ones, there was recently a major study, in fact, we're in the middle of it in Texas right now called competitive renewable energy zones and they identified 150,000 megawatts of quality sites. They're available, but it's going to be limited in your ability to use it, use it locally, but also export it to other areas where they can use it.

Texas has always embraced the idea that it is an energy producer. There's other states that take that on. You mentioned the NIMBY issues and BANANA issues. In Texas and other producing regions, they can build large-scale projects, so——

The CHAIRMAN. I understand that, but I mean Texas hasn't always embraced it. I mean TXU was going to build 11 coal-fired plants and so that's clearly a lagging indicator of where the future is going. And now, with the new owners they're moving in a different direction. I don't know if they're embracing renewables. They're saying they can get by with only three coal-fired plants. But to the extent to which Texas is now becoming the leader, and showing the way, I'd just like you to elaborate and then I'll allow the other witnesses to answer.

I read a story in The Washington Post back in March. It was a story about West Texas, and a family in West Texas that was now allowing these turbines to be placed on their farmland and while they kind of missed the farmland and they were taking photographs of what it looked like, with one wind turbine per acre, they were already up to 23 wind turbines and the story said that some farmers get paid upwards of $10,000 a turbine. That might be on the high side. But even let's say $5,000, $3500, you put up a 100 of those turbines on your farm and you can plug it into the grid, you've got a pretty stable source of income for your children, for

your grandchildren out into eternity really in terms of providing electricity.

So is that really what's happening? Is this catching on like a fever out in West Texas with farmers and ranchers, put those wind turbines on my land?

Mr. SLOAN. Absolutely. It is a boom, just like the oil boom in the '30s and '50s in Texas. There's essentially a frenzy going on to get in the wind business. There's this limitation of the infrastructure, but that is being dealt with by the State of Texas through this process.

The CHAIRMAN. Tell me about, what effect did the Renewable Electricity Standard that Governor Bush put on the books back in '97 or so, have on this wind explosion? Is there a relationship between the Renewable Electricity Standard that he signed into law and this phenomena?

Mr. SLOAN. Absolutely. If you think about it, there's other places in the country that are as windy as Texas. We've got good wind sites, but other places, South Dakota is an example, maybe even has better wind sites. Everyone had availability to the production tax credit, the federal incentives, yet Texas really took off and it was because of the quality of the state incentives. It was laid out in a pretty simple fashion, the RES in Texas. And importantly, all of the stakeholders got involved.

Originally, there was hesitance from a lot of the utilities. They were very skeptical. But when you had public polls where the utilities' customers were saying listen, we really want more renewable energy, everyone got on board. The political leaders, the electric utilities, and other stakeholders, the industry and consumer and environmental groups, and it really was a recipe to make it all move forward. So that's the important thing about an RES. It is a catalyst to get action going.

The CHAIRMAN. Mr. Hobson.

Mr. HOBSON. This is exciting. It's exciting stuff. It's great that we're able to take advantage of wind resources in the country where they exist, but I think it's important to keep this in context. We operate in this country and we demand as consumers of electricity an electricity system that operates at 90 plus percent reliability. The best wind turbine in the very best wind site has an availability probably no more than 40 percent of the time. And so when we reach a point in this country where wind turbines are called on to do more than just supplying energy when they can, which is what's going on today, when we get to the point where we want to rely on wind turbines as a part of the backbone of the system, we will have to put in place traditional generation technologies that will be able to operate during those times when wind is not available.

So for instance, if I have a load forecaster who tells me next year we're going to need 1,000 additional megawatts in Georgia and we decide that we're going to do that with wind, I will have to build right beside it another 1,000 megawatts of say gas-fired combustion turbines or combined-cycle units because I can't count that wind as capacity. It won't be available when I need it and so I have to make sure that my 90 percent reliability threshold is met and you can't do that with wind.

The CHAIRMAN. How is Texas handling that issue, Mr. Sloan?

Mr. SLOAN. These are issues that have come up. We hear these all the time. And I will just point to Europe. Europe already uses very high penetrations of wind. Some countries, for instance, Denmark, in a single month earlier this year the average energy was 35 percent coming from wind power. So it can be done. I mean there's physical examples of how it can be done and I would actually argue that wind power makes the electric system more reliable and the reason is because utility planners do not count on it to be there for capacity. It is an energy resource. So it's there sometimes when you're not expecting it, it will be there. And an analogy would be in this room you have lights. You have enough lights to make sure that you can light this room, but if these lights go out, you could probably open those shades behind and take advantage of natural light.

The natural wind resources, solar resources, the fuel is free. And you—it's almost sort of common sense approach. Take what nature gives you and use your controllable resources when you need to, to fill in the gaps.

The CHAIRMAN. Doesn't wind have a higher capacity factor than natural gas?

Mr. SLOAN. Yes, it does, on average in this country. One thing I want to see if I can clarify——

The CHAIRMAN. And isn't natural gas increasingly going to become a problem because we're going to be importing it as liquified natural gas from more and more unstable parts of the rest of the world. And so that is also a factor. You have that instability as well and it does raise issues there.

Mr. Hobson.

Mr. HOBSON. Mr. Chairman, as much as we would like for it to be, any 40 percent capacity factor source of generation cannot become the backbone of a 90 percent plus reliable electricity system.

The CHAIRMAN. Can it become 15 percent of it?

Mr. HOBSON. Well, it can't even really become 15 percent of it. He said it correctly.

The CHAIRMAN. You're saying the Governor of Colorado is heading for trouble having a 20 percent standard?

Mr. HOBSON. No, no. Understand what I'm saying. He said it correctly. If I have wind, if I have wind resources, if I have enough capacity on the ground to meet my load through traditional means and I have wind resources that are available to me, sure, it makes a lot of sense to take advantage of that free fuel when I can and not run another source of energy. That makes sense. But I have to build the capacity to make sure I can supply my customers when they call on the demand.

So my customers in essence will be paying twice as much for generation, because if I put a wind turbine on the ground, I've got to put a gas turbine on the ground as well. But as long as we are developing wind resources as we are now, for those areas where reliability is not the issue, I think that's terrific. I think that it becomes problematic when we think we're going to be building 40 percent capacity factor resources to supply electricity for our customers. In a 90 percent system, it's just not going to happen.

Now technology may get better. But where we are right now, I can't rely on a 40 percent capacity factor wind turbine to supply my customers.

The CHAIRMAN. And how does Denmark do it, Mr. Hobson?

Mr. HOBSON. I'm sorry?

The CHAIRMAN. How does Denmark do it?

Mr. HOBSON. I'm not familiar with Denmark.

The CHAIRMAN. Could you do me a favor? Could you look at Denmark and then in writing, send back to us your answer as to why we could not adopt a system like Denmark in order to ensure that wind is incorporated, not at a 35 percent or 25 percent, but at 15 percent level. If you could give us that analysis, have your experts look at Denmark and tell us what is different in their system from ours.

Mr. HOBSON. We would be happy to do that.

The CHAIRMAN. Okay, that would help us.

Mr. HOBSON. My suspicion would be one of two things, Mr. Chairman. My suspicion would be that Denmark, if you look at Denmark, they have a backbone electrical system that can manage their needs and use the wind resources when they are available.

The CHAIRMAN. Right.

Mr. HOBSON. Or interconnections with other countries.

The CHAIRMAN. Right.

Mr. HOBSON. They have some source of power.

The CHAIRMAN. But we could do that, too. I mean, the Southern Company, obviously unconstrained by PUCA is across more and more states and so obviously you when advertising, changes in laws is a way for you to interconnect and have more efficiency across state lines, right?

Mr. HOBSON. Sure, sure.

The CHAIRMAN. And of course, the more states that are included in any grid is the more likely the wind is blowing in some other state, you know? Another 500 miles away, and that's then going to be part of this interconnected grid, so it doesn't have to be, it doesn't have to be windy in all parts of a grid in order to get a 30, 40 percent. It just has to be windy in parts of the grid in order to kind of maintain that level of stability.

And then I think statistically, you would probably wind up in a situation where it is highly unlikely to not be windy everywhere at the same time, you know? That probably doesn't happen very often anywhere as long as the grid is interconnected and it is large enough. So I guess what I'm saying is where there is a will, there's a way, and it just depends upon the, but again, analyzing Denmark would be great because it seems to me that's what you're saying, there's an interconnection they can get it from other places and if that's possible, that would help us.

Ms. Floyd.

Ms. FLOYD. Yes, Mr. Chairman. I just want to put my venture capital hat on and to say that, you know, $2.4 billion of capital didn't go into the status quo. And so to be assured that there is money and investment going into new energy storage technologies, that could be at a very large scale, that there is investment going into when you talk about overall wind potential. And again, there are many technologies. We've talked a lot about wind and solar

today, but looking at wind turbines that are very efficient in moderate wind regimes, not just the very highest wind regimes.

So I just want, again, to remind the Committee that there is new technology being developed that when we invest, we expect there will be commercial product within a year or two of that investment and a lot of money going into energy storage.

The CHAIRMAN. Thank you.

Mr. Foster, you had your hand up.

Mr. FOSTER. Yes, Mr. Chairman. I was going to observe that my State of Minnesota has the distinction of being the largest importer of electrical energy of any state in the country. So we've looked at the development of the wind resources in Minnesota, really, as an opportunity for promoting a level of homegrown energy production and energy independence, one of the themes of this Committee.

But the largest source of Minnesota's power has been from the Canadian Manitoba hydro system, and in my experience in talking about these issues in Minnesota, the hydro systems provide themselves really as natural energy storage locations for wind reserves, so that when wind resources are being utilized, hydro systems can be in a sense turned off and the energy stored that would otherwise have passed through the hydro systems, and so it seems to me that you've got built in to an awful lot of the energy systems in the United States already, home grown storage facility for the complimentary use of hydro with wind generation.

The CHAIRMAN. I mean, like Minnesota, New England imports electricity from another country as well, Canada. So we import. What would be their receptivity, for example, of Minnesota to importing electricity from South Dakota if they were able to exploit their wind resources there and the transmission issues were overcome. Would that be something that was consistent with the history of importing electricity from Canada?

Mr. FOSTER. It certainly would in our state. And then I obviously understand in this debate the sensitivities that states have about importing energy from other states, but that certainly has been our history of producing electricity where it is cheap and where fuel sources were cheap and then importing it. The thing that I have found most exciting in terms of economic development is the degree to which the growth of renewable energy really touches every state in the country and every state has the potential for producing its 15 percent renewables on its own, which is something that didn't currently exist under our current system of electrical production, my home state of Minnesota being a prime example, because until the development of efficient wind resources, we never had the capacity to generate much of our own electrical fuel.

The CHAIRMAN. Right. I mean, New England is not too far different there. So I guess some states get used to importing oil or any energy resource. Other states get used to exporting it and don't like the idea of importing anything from anyone, but I think that is more of a personality factor than it is something that can't be dealt with as a market issue. The Southern Company seems to want to avoid importing any electricity into its region, but other regions get used to it just out of necessity. I think that is a factor as well.

There are always agreements that can be worked out. In grammar school, at least in Boston, we have a chapter in every one of our geography books entitled Our Friends, the Canadians. So we just learn how dependent we are going to be upon the Canadians for so many things from the early age, and we don't even give it a second thought that this hydro and all this natural gas coming down into our region. We kind of accept it as part of our energy profile, at least my 31 years on the Committee.

Mr. Reedy, can we go to the solar issue in Florida? Mr. Hobson is talking about the clouds in Florida and how it's not as good as Arizona or New Mexico. Is that true?

Mr. REEDY. No. No, sir. We do have less solar resource in Florida. It's a different kind of solar resource. It's diffuse. It has a large component of diffuse energy as compared to direct sunlight and direct focused energy. But photovoltaic panels respond very well to diffused energy.

The CHAIRMAN. Are there success stories in Florida right now?

Mr. REEDY. There certainly are. We do have our resource, when compared to the very best in the world is about 85 percent of the resource say in Arizona. And Georgia is something around 83 percent. I don't call that limited and I don't call that inferior. That 83 percent is twice the resource in Germany, as we've discussed earlier today.

The CHAIRMAN. So Germany is successful in deploying solar at 40 to 45 percent.

Mr. REEDY. Of the world's best, yes, sir. That's correct.

The CHAIRMAN. And would Arizona and New Mexico be at 100 percent and Florida and Georgia be at 85, 83 percent?

Mr. REEDY. Something of that nature, so the success comes from the distributive nature of the——

The CHAIRMAN. In other words, they would be in the upper quintile in Florida for wind potential.

Mr. REEDY. Absolutely.

The CHAIRMAN. I mean solar potential.

Mr. REEDY. It is the Sunshine State. I owe that to Governor Crist.

The CHAIRMAN. In 1940, there were 16 Congressmen from Massachusetts and 6 from Florida, 1940. We now have 10 and they have 30.

Mr. REEDY. My grandfather was one of those immigrants.

The CHAIRMAN. I think they left for the weather.

Mr. REEDY. Yes, sir.

The CHAIRMAN. The sun. It might not have been the sun, but that's what they all said when they were saying goodbye, that they were just tired of the winters, the clouds, the snow, the rain, and they were going down to the Sunshine State. So it does seem to me that they would be in the upper quintile of sun available and then the technology deployed to capture it would, it would seem to me, have to be developed that might be somewhat dissimilar from Arizona or from Germany. But clearly that's more of a question of will than technology.

Mr. REEDY. Absolutely.

The CHAIRMAN. You do agree with that?

Mr. REEDY. I agree with that and I think that having the certainty is the real measure of success. We know where we're going.

The CHAIRMAN. Again, Mr. Hobson, do you dispute that Florida is in the upper quintile of the country in terms of availability of sunshine?

Mr. HOBSON. No, Chairman, like I said earlier, I'm going to try to draw the distinction between solar, several things I'd like to say about solar. One is I like to draw the distinction between the demand side use of solar versus the supply side use of solar. I think solar has great promise, even in the Southeast we see examples of it all the time of individual applications of solar for end use. For instance, we sponsored with Georgia Tech during the Olympics their swimming natatorium is all solar panel. Southern Company helped. Georgia Tech. We funded that. It's still operating today. It's a great application. There are those kinds of applications.

It just becomes a different value proposition when you're thinking about using something like solar on a large scale for the production of electricity on the supply side. It's not—it's still things like reliability.

The CHAIRMAN. I understand that. No, I understand these reliability questions which—can I ask the Southern Company as well then to provide for us your analysis of the comparison between the Southern Company and Germany in terms of their integration of solar into their grid and why you couldn't do that, what obstacles would be for you to match Germany at a 40 percent solar level with—it seems to me a higher level of predictability and guaranteed sourcing.

Mr. HOBSON. One other point I would say about solar that has to be made and that is that we operate in a region where our customers are paying about 8 cents a kilowatt hour for electricity. We view solar in the 50 cents per kilowatt hour range and so aside from just the technical challenges associated with solar, there are economic challenges.

The CHAIRMAN. Can I go back to you again, Mr. Reedy, in Florida, is it 50 cents a kilowatt hour?

Mr. REEDY. No, sir, Mr. Chairman. Even in a one off small applications, it's well below 30 cents a kilowatt hour. In utility scale applications, there's analysis that supports something around 11 to 12 cents a kilowatt hour, in large, very large utility applications.

The CHAIRMAN. Could you give Mr. Hobson an example of where it's under 30 cents a kilowatt hour already? You might not be able to know where of in Florida?

Mr. REEDY. Throughout the markets in California and New Jersey which is pretty far north again, a fair amount of clouds. Those are the costs that are being seen by installers and contractors and by the end user. So we would take great issue with those figures and the technology is vastly improving and by prediction and analysis of the Department of Energy it's going to be down around 15 cents in about 5 years.

The CHAIRMAN. Is Governor Crist pessimistic about solar energy in Florida? Is he aware of how cloudy it is down there?

Mr. REEDY. Governor Crist has a saying, he says, "It can be done. It can be done." He is very optimistic about it.

The CHAIRMAN. I do think it gets cloudy down there in Florida. You're on the beach all day. It's unbelievably hot. You've got 35 skin protection on to protect you against the sun, then around 4:30 every afternoon you have a thunderstorm that cools off the state. It's really—it happens every day and then after an hour it gets nice again. So that's a misimpression those of us who pay a lot of money to go to Florida to get warm during the day have, but the clouds it seems just don't last that long or at least the ads kind of just have the clouds going by very, very briefly. The rest of the day it's quite beautiful.

So I just think that we need to work a little bit more here with the Southern Company in learning a little bit more about Germany and Denmark and other states that have already reached a lower point price, a price point for their solar.

Let's do this. Let's ask each of you to give us the one minute that you want us to remember, as we're going forward about these issues. And we'll go in reverse order and we will begin with you, Mr. Foster.

Mr. FOSTER. Thank you, Mr. Chairman. I would like to stress to the Committee as someone with a lifetime of activity being concerned about working people and their jobs that we're losing the global economic competition in this country because of our tolerance of energy inefficiency and our reliance on dirty forms of energy.

We're seeing the alternative in countries like Germany and Denmark, Japan. Germany uses half the amount of energy per capita as we do. We have a way forward that would do an enormous amount to restore manufacturing capacity in those parts of our country that have been hard hit over the last decade, losing some three million manufacturing jobs. We can do it based on a strategy of embracing global warming solutions which include, as I said, very specific targeted mandates from federal government like a Renewable Energy Standard by believing in the efficacy over the long term of meeting the global warming challenge, by capping our global warming emissions, and relying on the creativity and innovation and hard work of the American people. Thank you.

The CHAIRMAN. And how many jobs again, how many jobs do you think are at stake here?

Mr. FOSTER. We believe that we would be on balance 1.4 million jobs better had we taken on seriously the Kyoto Protocol targets ten years ago.

The CHAIRMAN. Thank you, sir. Mr. Reedy.

Mr. REEDY. Thank you, Mr. Chairman. I would close with an emphasis that solar energy is extremely predictable, extremely reliable and is becoming extremely economic. And I look forward to the day that we would be not discussing its cost as greater than conventional generation and that day will not be so far off, I would add, but rather less than conventional generation and it would serve the utility well as a peaking unit which is a common practice today and is today economic with peaking generation. So I would urge with the lead in photovoltaics followed by solar thermal energy, we will find this discussion delightfully moot in the near future.

The CHAIRMAN. Mr. Hobson.

Mr. HOBSON. Mr. Chairman, what I'd say I would like for us to look to the success that the State of Colorado has had, and hopefully, we'll continue to experience in the future, and focus in on that that is a state who took a look at its renewable possibilities and is exploiting those to the greatest extent.

Southern Company is not opposed to commitment to renewable energy. All we would call for is to allow the different regions and the individual states to look at the resources that are available, make their own determinations for how much they can do and what limitations they have, and not try to put a one size fits all renewable strategy across the country.

The Federal government should have an opinion, should tell the states we think this is something we need to do and then turn to the states and let the states assess their own situations and develop standards that make sense for them, rather than have to worry about whether or not they fit into a group, a nationwide group.

The CHAIRMAN. Thank you. Mr. Sloan.

Mr. SLOAN. I want to start off by saying thank you for the opportunity and I want to point out Texas is a conservative state and I can assure you they do not like mandates. Yet, they do listen to the public and the public made it very clear that they support renewables and they believed everyone should do some renewables and that people that want to do more could do more.

Texas policy leaders listened to that. They responded and they passed proactive, well-conceived, and highly effective rules. I think it's encapsulated—I asked the chairman of the State Affairs Committee, as conservative Republican as you'll find in Texas, David Swinford, and he put it this way about a mandate. He said "sometimes, if it's important enough, you just got to give it a little bit of a shove."

The CHAIRMAN. Ms. Floyd.

Ms. FLOYD. Last night I listened former Fed Chairman Alan Greenspan and he said one of his key messages was this country is headed for economic decline or we need to change technology. And the question is how quickly can we change technology?

Things have changed in this country with resource depletion, energy security, global warming, and it makes traditional energy technologies untenable. And we have the opportunity to participate in one of the biggest economic development efforts, one of the biggest growth industries of this century and I think the passage of a national renewal electricity standard will show our leadership and will help us capture this growth opportunity.

The CHAIRMAN. Thank you. And we thank each of you for your testimony today. You're really helping this whole debate that we're having here in Washington and we're having across the country and across the world. Back at the dawn of the industrial age in the United States, in my congressional district, when it began, when the Cabots and the Lowells built their first factory right on the Charles River in Waltham in my district, there were 280 parts per million of carbon dioxide up in the atmosphere. Now we've moved to 380 parts per million, putting another blanket over our atmosphere, warming up our planet even more.

If we allow it to go to 450, 550 parts per million, adding a second blanket, a third blanket that will continue to heat up this planet, then there are really catastrophic consequences.

I visited with the Speaker and the Select Committee in Greenland over the Memorial Day break. Greenland has a thousand mile long ice cap on it. It's 300 miles wide and it is ten Empire State Buildings high. So think of looking at the top of the Empire State Building and then looking up ten more times. That's how high the block of ice on top of Iceland is.

And on top of it now, are forming these huge lakes that are getting larger and larger, and as the summer goes on, they eddy, they burrow down right to the bottom of the ice cap and the water then flows to the bottom of the ice cap, creating these mulans that then further liquify, further lubricate the bottom of the ice cap moving it ever more quickly towards the ocean.

As the ocean rises, of course, Florida will be one of the principal victims. So will Cape Cod, the coast of Massachusetts. That's why Massachusetts sued in the case, Massachusetts versus EPA. They were contending that they should have the right to protect themselves against this rising tide of climate change that was affecting our 200 miles of beaches.

And the Supreme Court ruled in April 5 to 4 that Massachusetts was right and that we needed a national policy to deal with this issue, that Massachusetts alone could not deal with it, that we needed a plan that we were going to put together. And it called upon, the Supreme Court did, EPA to make a ruling on CO_2 and whether or not it's a pollutant, whether or not it is causing this heightened climate change, this global warming.

Now the EPA, unbelievably, still has not ruled whether or not CO_2 is causing global warming. Every other environmental minister in the world talks to their countries in those terms. Our environmental minister does not. No one knows the name of our environmental minister that might be the beginning of the problem, that no one even knows his or her name.

But that is and of itself indicative of the fact that no one state can deal with the problem, that we need a national plan and then with that national plan we can talk to China, we can talk to India. We can talk to the rest of the world. No one intends on this being onerous. I think it's just a matter of technology. I think it's out there. We can allow the states to be flexible in using the technologies and the resources that they have in order to meet this renewable objective, but I think that we cannot compromise on the objective which has to be that we begin to first stop and then reverse global warming. And this is one of the central ways to do it, to generate the electricity which we need.

And in a lot of ways that's what we're learning, that 100 years ago, Thomas Alba Edison, finding ways of deploying electricity across our country and then across the world, what a gift, a gift that led to washing machines and televisions and computers and iPhones that ultimately resulted, however, in all of this additional fossil fuel-generated electricity.

So like many things, there's a Dickensian quality to it. It's the best of technology and the worst of technology now at the same time. And the same thing is true for the automobile. What Henry

Ford did in learning how to mass produce these vehicles, it was wonderful. It transformed our country and the rest of the world, but 100 years later, we can now see how much it pollutes.

So moving to hybrid technologies, moving to cellulosic fuel for our vehicles in the same way that we have to move increasingly to renewables for our electricity generation deals with the other side of these technologies which is the consequence that it can have for the whole planet, and as a result to everyone who lives on it. And that's all we're really talking about now, a technological addition to what was invented by these great people long ago to the benefit of our entire civilization.

And we thank you for your contribution to this debate and we yield to the gentleman from California who has just walked in, Mr. McNerney for his round of questions. And I would ask the gentleman if he would then adjourn the hearing at that point, at the conclusion of his questions.

Mr. MCNERNEY. Thank you, Mr. Chairman. I had to run between meetings so I'm sorry I'm a little late, but I appreciate all of your inputs. It's been interesting and informative. I have to say that I'm glad to finally meet Ms. Floyd. We've had several telephone conversations over the years, as I was trying to raise venture money for wind turbine projects, but let's see, my first question is for you, Ms. Floyd. How confident are you that the national renewable portfolio standards would increase the manufacturing base in this country for wind energy, for solar, for other forms of new energy technology?

Ms. FLOYD. I'm very confident. It sends a very strong market signal. It's one that investors will respond to and I want to further your point that this is broader than solar and wind. While you were out voting I made the point several times that $2.4 billion of venture capital last year didn't just go into solar and wind, but really a broad range of technologies that can make a difference here.

And so I'm very confident this would send a strong signal to the investment community and to manufacturers, that we would see manufacturing coming back into this country and business expansion happening here as a result.

Mr. MCNERNEY. My light keeps going on and off. That's encouraging because we've seen so much flight of certainly wind, solar, fuel cells, going overseas. And whatever we can do to encourage that flight back to this country I think would be beneficial. Are there any other Members that have a comment on that question? Looks like you're ready to go there, Mr. Sloan.

Mr. SLOAN. Yes, and I would also concur that an RES will really make the manufacturing market take off. Wind is really at the leading edge of the renewables that are going to be used and I think particularly for domestic manufacturing the parts are so large and expensive to move around they make a lot of sense to build near the markets. Already in the State of Texas just with the announcements that we've had with making sure the transmission system is going to be there and the announcements from investors that want to build, there has been a big uptake in manufacturing plants want to come to Texas.

One is the wind with TECO-Westinghouse. They just built a plant in Texas. There are several others that I am aware of that are in negotiation right now. That's just the Texas market. When you talk about the whole country with a long-term stable policy, that's what the manufacturers want to see. As I noted, there is a market there and not just a market today and gone tomorrow, but a long-term steady market and they will show up here.

Mr. MCNERNEY. Thank you. Mr. Foster, did you have a comment?

Mr. FOSTER. Yes, Mr. Chairman. The proof, I think, is in what's actually taking place already as a result of the passage of state Renewable Energy Standards and earlier, when you were out of the room, I listed a half-dozen locations where plants have located specifically as a result of the passage of state Renewable Energy Standards, ranging from Pennsylvania to Minnesota and Iowa.

In addition, our studies have shown that there are some 43,000 firms in the United States capable of manufacturing the various component parts that go into the renewable energy industry, all of whom would be impacted by the passage of a national Renewable Energy Standard. I think the reverse is important to note, though too, what happens when you don't pass one.

I was in Kansas recently meeting with state officials there, responsible for that state's renewable energy initiative, which is not being done as a mandate, but simply on a voluntary basis. And they express great frustration that the one thing they could not accomplish with a voluntary goal was the attraction of manufacturing to their state, that manufacturers are simply not interested in making the investment where there isn't some degree of market expectation, that those products will be used.

So passage of a national Renewable Energy Standard in my view would be critical to bringing the manufacturers from around the world who are already doing that work to locate their plants in the United States.

Mr. MCNERNEY. Thank you, Mr. Foster.

Mr. Hobson, you've mentioned that solar is a little too expensive to seem practical in the southern states. There is some new technology that I would describe it as broadband solar photovoltaic, where they concentrate power on a small reactor that takes advantage of ultraviolet, infrared, and visible light. Do you think that would increase the viability in your opinion of solar in those areas?

Mr. HOBSON. I can't specifically answer the question, Congressman, about that technology. But I think if it is a technology that number one, drives the cost of solar down to fit more into the cost that consumers are paying in the Southeast, that would be very positive. And if it is a technology that improves the reliability of solar so that we can depend on solar a much larger percentage of the time. I think clearly, those are the two factors that would make a technology more viable and more easily adaptable into the supply-side of the grid.

Mr. MCNERNEY. I understand everything you've said, but to describe solar as not reliable I think is something that would be arguable. So you might want to look into that and the reliability of solar equipment is very good now from my understanding.

Mr. HOBSON. Let me be sure I am clear. When I said reliability in that sense, what I mean is the amount of time that the solar, that the resources there to provide the energy. I'm speaking about the reliability of the solar equipment itself.

Mr. MCNERNEY. Thanks for the clarification.

Mr. Reedy, do you think the time of day credit requirements would help significantly impact the solar, the cost viability of solar production. I mean, in your testimony you mention that solar energy is available when the load is the highest, at peak load and there is no provision for time of day credit. Would that be an advantage, is there some way to include that in federal regulation?

Mr. REEDY. It certainly would. Yes, sir, Mr. Chairman.

Currently, the utilities, when they consider generation, it's all about time of day and that's how the numbers that I gave are derived is from the cost at that time of day. Most states do have a time of day provision or rate structures for the utilities to offer their customers and it is very critical in any type of regulation or legislation that the rate be non-discriminatory. If you would otherwise qualify for time of day, that if you have photovoltaic generation that you can also be on the time of day rate.

And to give an example, in Northern California today, the time of day rates are very high on the peak period and the photovoltaics are cost effective against those rates, and so you could follow a strategy of generating during when it's worth the most to the utility and using your load when it cost you the least and it works very well.

Mr. MCNERNEY. So that might be another avenue to look at, Mr. Hobson, about the cost-effectiveness of solar if you can get the local utilities to pay for actual peak load cost.

Well, it looks like I've run out of my time and I want to thank you for your patience in my arriving late and answering questions. I want to agree with Mr. Foster that this global warming is an opportunity for this country. It's also a significant threat and a challenge. But if we take advantage of the opportunity, we can create new industries. We can revitalize our rural economies. We can end our dependence on oil and a whole host of things that would be advantageous to our country. So I encourage you to continue your good work.

Thank you very much. The meeting is adjourned.

[Whereupon, at 12:27 p.m., the hearing was concluded.]

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

Dear Governor Ritter,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, back to me at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming

1) **There is a wealth of analysis indicating that the growth in renewable generation spurred by an RES would have a tremendous job creation impact in our economy. According to UCS, a 20% RES would create more than 355,000 new jobs, and many of the witnesses alluded to job creation impacts in their written testimony. Exactly what types of jobs these would be? What is the potential income range? Are they high-end research jobs, middle class jobs that can help reinvigorate our manufacturing base, or a mix?**

   In Colorado, our experience has been that there is a mix of income ranges for the jobs created by the new energy economy including construction, manufacturing and high tech R&D. For example, the recent development of a wind turbine blade manufacturing plant by Vestas in Windsor, Colorado will generate over 600 jobs, paying between $35-45k with a full benefits package of health care, dental care and life insurance. Construction jobs associated with wind and solar farm development are competitive with prevailing construction rate and employ local citizens. On the other end of the spectrum, Conoco-Phillips recently announced that they will be developing an R&D facility near Boulder, Colorado – those jobs will be in a much higher salary range. Other solar companies are able to employ high tech workers who have lost jobs in the high tech computer industry. A number of administration and marketing jobs are also created. With the creation of technical training and education programs, new jobs in higher education will also be created.

2) **It seems clear that an RES will help our balance of trade by bringing investment into this country instead of sending it overseas for fuel imports. Still, I'm troubled by the fact that foreign companies seem to be ahead of the market and that some of the biggest success stories in America involve foreign companies coming here to set up shop. I would appreciate it if the witnesses would comment on whether we risk being on the wrong end of global energy competition for another century if we do not adopt an RES? If we do adopt one, can America lead the global market in renewable generation?**

Clearly, other nations have taken the lead in establishing regulatory structures that have advanced the renewable energy industry. The value of a strong national commitment to renewable energy is most evident in Germany, a country with very little sunshine, which leads the world in solar energy production and consumption. However, in America we benefit from tremendous intellectual and creative capacity. With a sustained concerted effort at the national level to commit the country's resources toward capturing the tremendous opportunities presented by this emerging industry of the 21st Century, we can make up for the time we have lost.

It would be too early to claim defeat. Other countries are ahead of us in this effort, but they aren't far ahead of us. With a national RES we will be staking out America's commitment to not just being consumers in the emerging economy, but industry leaders.

I also wouldn't understate the cost benefit to the consumer in attracting investment in renewable industry manufacturing in the US. Cost associated with transportation as well as a weakened dollar serve to punish American consumers of renewable goods produced overseas. With the right national leadership, America could recapture a market with remarkable growth capacity.

3) **Another part of this equation is making sure renewable generation makes sense for consumers. Several studies have shown that an RES could save tens of billions of dollars by reducing demand for costly fossil fuels. Other potential benefits include using distributed generation to allow people to install renewables at their homes and sell excess power back to the grid, creating a positive return. Over what term does the panel think these types of savings are achievable if we adopt an RES? What type of enhancement to the grid or to net metering regulations do we need to make to help homeowners realize the full benefit?**

In Colorado, our RES has a solar carve-out. 4% of all production must come from solar installations, half of that from distributed (rooftop) systems. In developing a regulatory structure to support this requirement, interconnection and net metering standards that create parity between the utility and the distributed generation systems were essential. Finally a system of rebates established by our Public Utilities Commission allows businesses and homeowners the opportunity to monetize the value of their production by selling the Renewable Energy Credit (REC) to the utility before the utility can count the

production toward compliance with the RES. The response has been tremendous. We have seen great participation by our utilities that have fully implemented the RES (because of differing requirements between PUC regulated utilities and others) and those who have not.

Standardized Net Metering is critical to the success of a distributed generation program. Most people are at work during the day when their solar systems are at greatest production capacity, so giving them a true kWh credit with a two way meter is the only way to fairly credit them for power produced and delivered to the grid when their systems are at maximum production. They can then pull the power off the grid when they are home. In this way the grid works as a battery for the consumer while benefitting from the production. Alternatively, the homeowner would have to purchase a large capacity of battery storage increasing their costs and depriving the grid of the clean power being produced by the system.

Successful design and implementation of price signals which reflect the value of power at different times of the day is also an important consideration for prolonged success of renewable distributed generation. Utility rate structures that price consumption based upon on peak and off peak usage often more accurately represent the cost to utilities to generate electricity throughout the day. One advantage that solar technology has under a Time of Use scenario is a peak in production close to the afternoon peak demand common to Colorado's utilities. Higher net-metered revenue to the customer on a Time of Use rate means quicker payback for solar electric systems and smaller upfront rebate incentives needed to stimulate the market.

The significance of the investment in solar power is substantial for a number of reasons. Solar power provides maximum production near the time utilities see peak loads. Solar generation can also be used to firm up the production patterns of wind which tend to maximize production at complimentary times. Furthermore, distributed generation provides renewable power without the associated high costs of transmission which can take years and billions of dollars to build. By providing production capacity without the associated transmission and fuel costs, distributed generation systems contribute to cost containment and sustainability of the grid.

In the future, integration of smart metering technologies will allow us to use solar generation to offset the tremendous costs of peak power units. In Colorado, Xcel is implementing a "smart grid" pilot program which will implement the next generation of utility power management, allowing for remote power demand control, communication of energy use to the consumer in real time as well as an integrated management of distributed generation power systems.

4) **Do you think that tax credits should be available for all types of renewable energy and not single out one type or another, thus putting certain regions of the country at a disadvantage?**

Tax credits for renewable production are critical to the success of America in capturing long term investment. Without the Production Tax Credit and Investment Tax Credit we lose billions of dollars of private investment and we will miss a valuable economic opportunity. The efficiency tax credit for homeowners is also a critical piece of the pie. We can increase production through the PTC and ITC and increase conservation through the efficiency credit – together, we create the policies to support an energy vision for the future.

Certainly different forms of renewable energy have different values based on their capacity and demand they are addressing. Furthermore, there are ancillary benefits to different forms of renewable energy in different areas of the country. Regional opportunities, benefits and challenges are different, but shouldn't be seen as disadvantages.

In Colorado, for example, we have a great benefit to our agricultural communities which are in high wind resource areas. We also have emerging businesses that are developing around solar with manufacturing and installation companies cropping up around the state. The benefit to our research institutions is also substantial. As we develop potential uses for woody biomass (using trees as a renewable fuel resource- especially the trees devastated by the pine bark beetle) either through power generation, heat generation or through the use of cellulosic technologies, we may be able to simultaneously reap the benefits of eliminating wildfire danger associated with a broad beetle-kill epidemic in Colorado.

Furthermore, the energy benefits of something like geothermal energy which can produce electricity 80-90% of the time is different than that of wind which produces 35% of the time or solar which produces 20% of the time. Finally, there are different benefits in different regions based on their load profiles. Areas in the south may benefit from resources that offset high air conditioning loads in the middle of the day, whereas the north may benefit more from an offset of electrical demand associated with lighting in the winter months or changing to renewable heating systems.

5) **Don't you think that an appropriate role for the federal government is helping to develop technology through research and development and grants related to R&D? Don't you think that enhancing that side of the equation would do just as well in promoting renewable energy?**

Investments in R&D and in development of renewable production shouldn't be seen as mutually exclusive.

The tax incentives offered by the federal government have been essential to the increases we've seen in renewable energy investment. A predictable financial stream associated with those tax credits is one of the necessary elements we've repeatedly heard from industry as critical to continued investments and new breakthroughs. At the same time, the advances in technology within the wind energy sector have also created an atmosphere where we are seeing broader levels of investment. We are at a similar place with respect to solar development (in both PV and concentrated solar technologies) and the potential for geothermal production is dependent on robust investment in R&D. So, the importance of the federal role in both advancing R&D as well as creating a financial structure which incents investment is critical to the success of renewable energy development in the US.

6) **On the issue of green jobs, the real question is, do we actually need workers with fundamentally different skills to do green jobs? I would say the answer is no, it takes the fundamental skills to manufacture a wind turbine, or a solar panel, as it does to build a car. Do you disagree with that analysis?**

   The skills are very similar, the application of those skills are specialized. But yes, of course there is a great deal of crossover particularly within the manufacturing and construction industries. But we do need technical training programs so those workers can develop the skill set particular to those industries.

7) **You talk of renewables as a "new economy" yet you have had to implement a sales tax exemption to subsidize the cost of renewable energy which is what will help keep the cost of power under control for your citizens. Is that correct? How much is it costing your state to provide these subsidies? And how much has the federal government provided in subsidies through the Production Tax Credit and the Investment Tax Credit?**

   Incentives have played a major part of every industry, perhaps less so in the New Energy Economy than with the traditional energy economy because there are so many additional benefits to communities associated with the development of renewable resources and absence of the costs of environmental remediation associated with extractive industries.

   The question of cost to the state is moot. If we offer an exemption from sales tax on a product that would not have been purchased in the absence of that incentive, the cost is nothing. However, the benefits associated with the jobs from that investment, the avoidance of environmental impact, and the securing of an inexhaustible energy supply are immeasurable.

8) **Colorado is a beautiful state. What, if any, transmission siting issues do you have in Colorado as you look to make changes to your power grid? I note that your wind resources seem to be in eastern Colorado and your solar resources in southwest and**

south central Colorado, while your population is centering up and down the Front Range.

We are very fortunate to live in a state that holds some of the most stunning landscapes in the world. We are also very conscious of the impacts to those resources. Much of our economy relies on preservation of that natural beauty, both by reducing environmental impacts that will hasten its degradation and minimizing the impacts of structures that will impede the view.

While siting of any kind of energy generation has its challenges, communities in Colorado are embracing development of the new energy economy because of the myriad benefits. By involving local governments and citizens in the debate over the relative benefits of building out our grid and a broad interest by the state in advancing the New Energy Economy, we have been able to resolve most siting issues, but I believe they will continue to present a challenge for the state as we continue to advance increases in energy production.

In Colorado, wind production has primarily been in the agricultural communities of the eastern plains. There are few areas of the state where there is a more visceral awareness of the value of water. When farmers are faced with the opportunity to create a water free energy generation system that will pay them money rather than relying on water intensive generation that doesn't provide them with income, there's a heightened interest in that kind of development.

9) **Have there been concerns expressed by Colorado's environmental community about wind power and its potential to harm birds? What are you doing to mitigate that issue?**

We have instituted a comprehensive review process to evaluate the potential impact to wildlife. There are still concerns around the impacts to some forms of wildlife, most significantly bats.

The issue of bird mortality is no longer as significant a concern with changes in wind technology over the past 30 years. Turbines are higher in the air, moving slower and out of flight patterns by virtue of the advancement of technology and a broader understanding of wind resource patterns.

Of greater interest to the environmental community at this point are the impacts on bird populations from changes in migration and weather patterns related to climate change.

As I mentioned previously, there is a significant concern regarding the environmental issues associated with water consumption in the generation of power. A coal plant demands approximately 500 gallons of water for every megawatt-hour produced. A nuclear plant, 700 gallons. In the West, those concerns are significant and the impacts

potentially devastating. Wind production and Solar PV production are virtually water free methods of power generation.

10) Are you concerned at all about reliability when putting an emphasis on renewables in your portfolio?

At some point in the future, perhaps if we reach 40%-50% of our resource from renewables, there may be impacts on reliability. However, we believe that by the time we reach that level of development (in perhaps 20 to 30 years) there will be significant advances in smart metering technologies that will enable us to manage renewable resources around their various production patterns as that power is delivered to the grid and there will be advances in potential renewable baseload production methods such as geothermal and solar thermal technologies. It is very likely that by that time we will also have a much more geographically diverse level of resource delivery to the grid which will minimize the issues of intermittent power production from renewable energy resources.

11) On page 1 of your testimony, you note that the most cost-effective resource is energy efficiency. I agree with you on that point. Can you tell use more about your plans to promote energy efficiency in your state outside of state owned buildings?

Our Climate Action Plan anticipates that 50% of our goal of reducing CO2 emissions 20% below 2005 levels by 2020 will come from efficiency measures. In pursuit of that goal, we are targeting both residential and commercial building systems. Within the residential and commercial sectors we are establishing the 2003 IECC energy efficiency code as a baseline for new residential and commercial construction. We are also partnering with building associations and the Environmental Protection Agency to increase the number of Colorado new homes being built to the ENERGY STAR© standard (approximately 15% above code). We are instituting an array of rebates and incentives targeted at increasing insulation levels in existing homes as well as the installation of solar heating systems, solar electric systems and small wind systems. In the commercial sector, we are advancing performance contracting options for commercial buildings throughout the state which will lead to up front investments in energy efficiency. We are focusing specific attention to enhancing the energy performance new and existing K-12 school building throughout the state. We are also currently developing a voluntary industrial efficiency program.

Finally, I have directed all of my agencies to achieve a 20% reduction in energy use in our state facilities and a reduction in the petroleum use in our fleet vehicles of 25% by 2012.

12) Since you are promoting renewables so heavily, does that mean that you are planning to decrease the state's coal, gas, oil and future oil shale production? With the kind of growth Colorado is experiencing, aren't you going to need all of these resources?

I believe our traditional energy economy can co-exist and thrive with our new energy economy. We are very supportive of technological advances in carbon capture and sequestration to shift our coal production away from an intensive carbon emission profile to a carbon neutral one.

We also believe establishing a diverse resource portfolio will protect consumers from price fluctuations from commodity based resources. By combining new energy generation, traditional energy generation and efficiency measures, we believe we will have sufficient resources to meet the demands of Colorado into the future and to do so in such a way that we do not sacrifice our environment or the economic opportunities of future generations.

13) **How much revenue does Colorado take in from your fossil fuel resources annually?**
Colorado has a strong fossil fuel industry. According to a recent Colorado School of Mines study, the industry is responsible for over 70,000 direct and indirect jobs contributing $23 Billion to Colorado's economy. The traditional energy economy plays an important role in our energy future and operates hand in glove with our developing New Energy Economy.

14) **I think in some ways you did an RPS right. Your constituents or voters actually passed one at the polls. You later increased it but at least you recommended and developed a program that makes sense for Colorado. But why do you want to push such a program on other states that don't have the resources Colorado does nor have their constituents voted for it?**

I am convinced that a unified national approach will stimulate the development of the renewable energy industry in the United States. Furthermore, studies have shown that a 20% by 2020 standard nationally would reduce gas prices by 5-17%. At this time of rising traditional energy costs, this would be good news for our citizens.

Supreme Court Justice Louis Brandeis observed that states are the laboratories of democracy. However, you diminish the value of those laboratories if you don't take advantage of results of their experiments.

If you were to look at the arguments that Colorado citizens faced from industry at the time that we passed the RPS, you would find they are the same reasons people assume the RES can't work nationally – we don't have the resources, it will be too expensive, etc...

In Colorado, what we found through our experience of taking that initial step is that these assumptions were just wrong. Certainly it's true that all states don't have the same resources. However, while we have great wind resources in Colorado, Tennessee has fantastic biomass resources with which we can't hope to compete; our coastal areas have tremendous energy opportunities not available to Colorado. We're a diverse

country with diverse opportunities, but only if we have the courage to embrace the promise of those opportunities.

15) I note that the National Association of Regulatory Utility Commissioners opposed an RPS provision added in the energy bill. Why do you think that regulators are charged with the responsibility of protecting utility ratepayers would oppose an RPS?

NARUC expressed a concern of their membership that I would agree with – that the cost recovery mechanisms should be determined by state regulators and not dictated by the Federal Government. In Colorado, we determined an appropriate cost allocation process that would ensure cost containment for our rate-payers. However, other states may have different issues that should be addressed by their regulatory agencies. This doesn't constitute an opposition to the Renewable Standard, but simply a different approach to the technical language associated with implementation.

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

Dear Mr. Reedy,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, back to me at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming

1) There is a wealth of analysis indicating that the growth in renewable generation spurred by an RES would have a tremendous job creation impact in our economy. According to UCS, a 20% RES would create more than 355,000 new jobs, and many of the witnesses alluded to job creation impacts in their written testimony. Exactly what types of jobs these would be? What is the potential income range? Are they high-end research jobs, middle class jobs that can help reinvigorate our manufacturing base, or a mix?

   The majority of these new jobs would be in the clean manufacturing sector (as technicians operating sophisticated machinery) and in the installation sector, where the work would be (closely related to well-paid construction jobs. The increased demand for more efficient PV cells and solar-augmented cooling technologies will certainly boost the basic research in labs and universities.

2) It seems clear that an RES will help our balance of trade by bringing investment into this country instead of sending it overseas for fuel imports. Still, I'm troubled by the fact that foreign companies seem to be ahead of the market and that some of the biggest success stories in America involve foreign companies coming here to set up shop. I would appreciate it if the witnesses would comment on whether we risk being on the wrong end of global energy competition for another century if we do not adopt an RES? If we do adopt one, can America lead the global market in renewable generation?

   R&D follows investment, and investment follows market demand. So it is certain we cannot lead in product innovation or market share if we do not realize strong market demand at home. When invited to set up shop in most US markets (outside California or

New Jersey), most manufacturers simply ask: "Why? – when we can see a certain strong demand for a product where there is a clear collective will to create a local market."

3) Another part of this equation is making sure renewable generation makes sense for consumers. Several studies have shown that an RES could save tens of billions of dollars by reducing demand for costly fossil fuels. Other potential benefits include using distributed generation to allow people to install renewables at their homes and sell excess power back to the grid, creating a positive return. Over what term does the panel think these types of savings are achievable if we adopt an RES? What type of enhancement to the grid or to net metering regulations do we need to make to help homeowners realize the full benefit?

   A nation-wide RES would provide the one requirement most needed for investment and the resulting cost reductions: Certainty of future demand. Various independent studies have predicted PV energy at parity with grid rates in the 2011-2015 time frame.

   A nation-wide uniform net metering and interconnection requirement would simply the balance-of-system and reduce waste, thus addressing the other prime component of PV cost. And true net metering is only and ultimately fair.

4) Do you think that tax credits should be available for all types of renewable energy and not single out one type or another, thus putting certain regions of the country at a disadvantage?

   Yes.

5) Don't you think that an appropriate role for the federal government is helping to develop technology through research and development and grants related to R&D? Don't you think that enhancing that side of the equation would do just as well in promoting renewable energy?

   Both sides of the equation are necessary. Government support of R&D is necessary until the improved systems near market-ready status. However, long-term market certainty is essential for the capital investment needed to actually deploy these systems in significant numbers (and build the factories, distribution and installation infrastructure). This is exactly the logic behind the monopolistic nature of utilities – they are required to make huge capital outlays with a very long-term payback.

6) On the issue of green jobs, the real question is, do we actually need workers with fundamentally different skills to do green jobs? I would say the answer is no, it takes the fundamental skills to manufacture a wind turbine, or a solar panel, as it does to build a car. Do you disagree with that analysis?

   Yes. And it is the same fundamental skill to wire a house as to wire a PV array.

7) I think we all agree that solar energy is a good resource for some renewable energy, but there are challenges to solar power also, correct? Is it true that consistency of sun, humidity, and hurricanes can be a real problem when trying to provide a baseload of solar energy to the grid?

No. Even in the humid southeast, the solar energy available for conventional PV or solar water heating is about 85% of the best in the world – hardly problematic. Hurricanes are not a problem, since solar systems are more securely mounted than the roofs they cover.

Finally, solar systems are not intended to provide baseload energy. They are the best peaking units available to a utility over the "ultra peak" period for most of the year. Far more predictable (on aggregate) and economic than starting the gas turbines that utilities currently utilize most warm to hot afternoons.

8) What, if any, transmission siting issues do you have in your state?

Transmission right-of-way is increasingly difficult to site. Distributed renewable generation does not require transmission, so PV, small wind, small hydro, and small biomass are all positive with respect to transmission.

9) There currently seems to be many widely available and practical applications of pv solar. For example, installing solar panels for home water-heater use can easily be done with current technology. What incentives, both at the state and federal level, do you advocate to encourage this practice? What do you foresee as the next applicable step towards the longer-term integration of solar energy?

PV and Solar Thermal systems (domestic hot water, solar space heating, and solar cooling) all need market certainty above all. The most effective incentive is the RES, which properly values the positive externalities of these forms of generation. A very important footnote is that Solar Thermal systems which directly offset electric energy consumption should qualify for credit under any RES (as now provided in several states).

10) On page 3 of your testimony, you offer a unique perspective on solar energy to residential properties by proposing that energy companies install and maintain systems at people homes rather than the home owners. Any idea how much that would cost for a town with say 10,000 houses?

As noted, the scarcest resource may ultimately be access to solar energy (rooftop space). To best utilize this scarce resource, an energy company should be able to install its generators through an easement (with fair market compensation) on consumer premises. This brings maximum utilization, and avoids waste of the roofs of multi-family housing and rental properties.

Fully covering the south-facing roofs of 10,000 average home would provide about 75MW of peaking power and cost about $260 million at the utility-scale costs expected in the anticipated period of construction. And no fuel cost, or O&M expense.

11) In your testimony you cite several positives of solar power over traditional fossil fuel electricity. What is the largest obstacle that solar energy faces?

The old "chicken or egg" syndrome. Volume begets lower costs, and lower costs beget high volume. So we have to change the dynamic with certainty of market demand (RES).

12) What is the current efficiency rate at which photovoltaic solar captures solar energy?

The highest cell efficiency in lab conditions is now 40.7%. Commercial module efficiencies range from 5% to 19% under Standard Test Conditions, depending on the technology utilized.

13) In your testimony you note a number of places that solar panels can be installed, and while I admit they are very creative, I also think they sound a bit like something out of a science fiction novel. Have you done any market testing with Florida citizens on how they would feel about everything looking like a space port in order to collect enough sun to produce power?

Actually, Florida is far less likely to look like a spaceport than the desert southwest. This is because land is too valuable on the market, and to our ecosystem, to cover with panels. The result will be generally the full use of rooftops. Several studies show ample rooftop space available in Florida without shade, with proper orientation, and generally accessible to produce about 33,000 MW today and about 65,000 MW by 2020.

And the "innovative" suggestions I made need not look so strange. Placing panels on the median barrier structures of interstate highways is no weirder than the barriers and highways themselves. Likewise airport perimeters are not so natural, and high voltage transmission line rights-of-way could partially compensate society for its clear-cutting destruction of the environment.

14) Can you tell us more about solar –driven absorption chilling and how it works?

It seems counter intuitive that we can use heat to cool, but it works! We can take advantage of the fact that evaporation and condensation are not symmetric processes – in other words, in a closed cycle it takes less heat energy to evaporate (gasify) liquids than is rejected when the gas is condensed (re – liquefied). By optimizing this process with the right refrigerant and design, we make an effective cooling system.

Absorption chillers were first conceived to use a fossil fuel (usually natural gas) as a heat source—so it was not a stretch to augment that expensive, non-renewable fuel with solar thermal collectors.

15) On page 4 of your testimony you talk about the photovoltaic industry growing at a rate of 40% per year – 83% projected for 2007– that is without a national RPS standard. So RPS isn't actually necessary in order for solar technology to continue to grow, is it?

As you know, expressing growth as a rate can be deceiving. For example, if the US had only 1MW of PV in 2006, and 2MW in 2007, the growth rate would be a dramatic 100%, but the impact of the growth would pale alongside Germany's addition of several hundred megawatts in the same year.

This high growth rate is confined to states with a strong RPS and other supportive public policy.

I mentioned the growth rate as an indication of the economic potential for jobs and trade that would be enhanced by public policy.

16) You represent the solar industry so you are pretty bullish on its prospects. I know the federal government and the private sector have been working on solar for many years and it is still extremely expensive. You say current costs are over 26 cents per kilowatt hour and I believe there are cost estimates even higher. But you say that sure enough in a few years it will cost only 8 cents per kilowatt hour. What is going to happen to make the cost go down that much?

The same factors that brought large screen TVs from $15,000 to $1,000 in 2 years. Volume, volume, volume. The processes are not extremely exotic, and the raw materials are relatively cheap.

Another big exponential change is happening in the Balance of System Costs (other than the PV module). Business concepts like vertical integration and synergistic construction practices are rapidly dropping the installed cost. And it is happening.

17) How much power during the day can be produced by solar? Others have said that solar can only make power about 15% of a day. I guess you lose 50% just because it is dark. Where does the power come from when the sun doesn't shine? Won't there always be a limitation on how much solar can be produced?

PV is intended as peaking power, but solar thermal energy systems can be nearly round the clock (through storage of heat energy). Gas turbines are intended to be used for only a few hours on very hot days, and they require expensive fuel. PV is superior to GTs, in that there is no detriment to running as much as possible. Furthermore, if the sun is not out, utility loads are generally light, and peaking power is not needed.

Utilities are already familiar with peaking concepts, and also storage (as with pumped hydro).