

RENEWABLE ELECTRICITY

HEARING
BEFORE THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
ONE HUNDRED ELEVENTH CONGRESS
FIRST SESSION
TO
RECEIVE TESTIMONY ON A MAJORITY STAFF DRAFT FOR A
RENEWABLE ELECTRICITY STANDARD PROPOSAL

FEBRUARY 10, 2009



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RENEWABLE ELECTRICITY

TUESDAY, FEBRUARY 10, 2009

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 10:03 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. OK, why don't we go ahead with the hearing.

During the past four Congresses, we have passed a requirement that utilities provide a specific percentage of their electricity from renewable resources, again and again. In the 107th and the 108th and the 109th Congresses, we passed such provision in the Senate, but the House would not accept it. In the 110th Congress, the House passed it, but we could not get a vote on it here in the Senate.

My own view is, it's time that we finally pass this provision in both houses and include it in legislation that we send to the President. It is one of the President's highest priorities.

The provision that the hearing is on today is a majority staff draft. It's similar, as to its mechanics, to the provisions that we have passed before, but it does have some significant differences. First, the requirement is raised from 15 percent by 2020 to 20 percent by 2021. Second, the resources that can be used to comply with the requirement have expanded; up to one-quarter of the requirement can come from energy efficiency. We've also included a new hydro—included new hydropower at existing dams that currently do not have generation.

The reasons to pass such provision are as compelling as ever. In my view, the renewable standard can reduce our dependence on fossil fuel sources, can reduce emissions of greenhouse gases and other pollutants. Another effect of this reduction is to cause a reduction in the price of the fossil fuels that are displaced. Such a standard diversifies our resource base, lessening the effect of supply disruptions on—or shortages, creating greater economic stability. It reduces our dependence on foreign sources of energy and creates greater energy security. This standard would also spur the development of a national green energy economy, creating hundreds of thousands jobs, many of them in rural areas.

Over the years, we've seen many economic analyses of the renewable standards that have been proposed. All of these analyses, that have been done by independent analysts, conclude that the cost of implementing the standard ranged from negligible to positive, with many showing significant reductions in the overall cost of energy to Americans. When you add the fact that we're going to do something to put a price on carbon emissions—and I hope we are able to do that, probably through a cap-and-trade system—you have to know that the cost of whatever we do to reduce carbon emissions will be greatly reduced by a significant spur to the renewable generation of electricity, such as in a renewable electricity standard.

I think that the votes are present in the Senate to pass a renewable electricity standard. I think they're present in the House, as well. I think that we need to get on with figuring out the precise provisions of that legislation. I hope to work closely with Senator Murkowski and other members of the committee on this job. The witnesses here today can help us greatly in that process. I look forward to hearing their testimony.

[The prepared statements of Senators Mark Udall and Burr follow:]

PREPARED STATEMENT OF HON. MARK UDALL, U.S. SENATOR FROM COLORADO

Mr. Chairman, I would like to thank you for holding today's hearing on this important topic.

Establishing a national Renewable Electricity Standard (RES) is something that I've been working on my entire career in public service.

In 1997, as a Colorado state legislator, I introduced several bills designed to advance renewable energy, including a state renewable portfolio standard. While my bills were voted down in committee and never reached the full House floor, my work in the Colorado House laid the path for action.

In 2004, I traveled across Colorado with the state House Speaker, Republican Lola Spradley, campaigning for the nation's first statewide RES ballot measure. Colorado voters approved Amendment 37, which required 10% renewable energy production for the state by 2015.

The Colorado legislature has since increased this RES to 20% by 2020.

I continued this work at a national level after being elected to the U.S. House of Representatives. In 2003, along with my cousin, then-Congressman and now-Senator Tom Udall, I introduced a bill to create a national RES. This bill became the basis for the RES amendment that passed the House in 2007. This amendment would have created an RES of 15% by 2020.

An RES is important for so many reasons. As demand for energy continues to grow in this country, we need to make sure that we continue to have affordable and reliable supplies. And, most importantly, as we move to more competition in the delivery of electricity, we must make sure that the environment and consumers are protected.

So it makes sense to put incentives in place to ensure that less polluting and environmentally friendly sources of energy can find their way into the marketplace. And that's what a renewable electricity standard, or RES, would help to do.

But it's not just about doing the right thing for the environment.

With almost all new electricity generation during the last decade fueled by natural gas, our domestic supply cannot sustain our needs. Iran, Russia, and Qatar together hold 58 percent of the world's natural gas reserves. As demand for power continues to grow, we shouldn't be forced to rely on these unstable regions to sustain our economy, nor do we have to.

The best way to decrease our vulnerability and dependence on foreign energy sources is to diversify our energy portfolio. Half of the States in our great Union have already figured this out and have made the commitment to producing a percentage of their electricity using renewable energy. But all of our States will benefit under a national standard, which will bring natural gas costs down nationwide, create new economies of scale in manufacturing and installation, and offer greater predictability to long-term investors.

By reducing the cost of new clean technologies and making them more available, it will help restrain natural gas price increases by creating more competition for those fuels.

An RES will spur economic development in the form of billions of dollars in new capital investment and in new property tax revenues for local communities, and millions of dollars in new lease payments to farmers and rural landowners.

Just look at what has happened in Colorado. At the time the RES passed, Colorado had less than 1MW of solar power installed statewide. Last year, Colorado installed over 18 MW, and there is over 40MW installed statewide today. My state is very much ahead of schedule to meet the 20% by 2020 requirement—half of the solar requirement for the full 2020 period has been met in the first four years.

Not only has that meant cleaner energy for Coloradans, but also more jobs. A major wind turbine supplier, Vestas, identified our state RES as a determining factor in locating 2,500 jobs to Colorado for its manufacturing headquarters for wind turbines. Governor Bill Ritter's office has estimated that just the solar component of the RES has brought nearly 1,500 new solar jobs to Colorado.

Some have argued that a national RES would burden some regions of the country at the expense of others. That is inaccurate—a national RES would create public benefits for all.

The argument that the Southeast is disadvantaged by the RES—that the Southeast has no renewable resources—ignores the plain truth. In fact, the Southeast is one of the regions of the country that will see the most benefit from this proposal. According to Department of Energy's Energy Information Administration, the technology that does best under a 15% RES is biomass. Already, 2500 megawatts of generation come from biomass in the Southeast, and much of the waste from pulp and paper mills is not being used to generate electricity.

In summary, a national renewable electricity standard will reduce harmful air and water pollution, provide a sustainable, secure energy supply now, and will create new investment, income and jobs in communities all over the country.

A national RES would be good for the environment, good for the economy, and good for our country. So I look forward to hearing from our witnesses today about the Chairman's draft, which would create a 20% RES by 2021.

Thank you.

PREPARED STATEMENT OF HON. RICHARD BURR, U.S. SENATOR
FROM NORTH CAROLINA

Chairman Bingaman, Ranking Member Murkowski, thank you for having this hearing today. It is important that we examine the details of a national renewable portfolio standard. I look forward to hearing from our witnesses today about the benefits and goals of a national RPS. North Carolina is the first and only southeastern state to implement a state RPS. While the southeast region lacks in renewable resources, North Carolina took a hard look at what the state could achieve and set goals accordingly.

As with most programs, the devil is in the details. We must be sure to craft a policy that utilizes all resources that achieve the goal of reduced emissions. This includes ramping up energy efficiency measures and perhaps including nuclear and hydropower. Over half the states in this country already have a state RPS. We need to find a way to incorporate these state programs into a national RPS so that we do not unfairly penalize the good work of early adopting states. I look forward to working with the committee to draft legislation that meets the goals of a national RPS while taking into consideration regional differences.

While I look forward to the testimony from the witnesses this morning, I am disappointed that we do not have an Administration witness to explain how an RPS would be implemented at the federal level. It is my hope that Chairman Bingaman will be able to schedule a second hearing on this issue so that we might be able to hear from the Administration.

Thank you, Mr. Chairman.

Before introducing our witnesses, let me call on Senator Murkowski for her statement.

**STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR
FROM ALASKA**

Senator MURKOWSKI. Thank you, Mr. Chairman. I want to thank you for holding the hearing today. I want to welcome some of our

new members that have not joined us on the Republican side before today. Welcome to you all.

This is the first in a series of hearings that the Energy Committee will conduct as we work to craft our third comprehensive energy bill. We recognize that we don't have any administration witnesses before us today. I would like to thank you, Mr. Chairman, for agreeing to hold a second hearing, regarding the issue of the RPS, to provide the Department of Energy and perhaps FERC, the opportunity to can explain how this complicated program should be implemented if we do move forward. I would also like to hear from another panel of stakeholders at that time.

I do know that this is an important issue for you, Mr. Chairman. You have been a champion on the national renewable portfolio standard. This was a new approach in the 107th Congress, when we first began considering renewable energy requirements for utilities. At that time, there was just a handful of States that had such programs. Today, we have got 29 States, including the District of Columbia, who have fashioned their own renewable energy programs.

States are in a better position, I believe, than Congress to determine what resources and what timetables work best for them. A one-size-fits-all national standard raises some serious concerns about regional disparities. We recognize that there are some parts of our Nation that are blessed with abundant renewable resources; others, particularly in the Southeast, lack the renewable resources, perhaps other than biomass, that would be needed to reach a 20-percent requirement.

I think we need to ask ourselves what are we trying to achieve with this program? Is our aim simply to increase renewable energy production, or is the goal to reduce greenhouse gas emissions? If the latter is true, it would seem to me that additional noncarbon-emitting technologies should be included. Now, some point out that choosing specific technologies actually conflicts with the goals for a market-based carbon-reduction program such as cap-and-trade. I think that one issue that people have reached consensus is that the RPS, as drafted, is not a climate-change solution.

I do not think that we can consider RPS in a vacuum. We know that our existing transmission network is inadequate to support our environmental goals. If the necessary transmission is not put in place—and that means dealing with the siting issues, the permitting, the cost allocation issues—if the necessary transmission isn't there, it is impossible to reach the new Federal mandate, and the customer will end up paying the cost of noncompliance.

I think we all agree that we have to find ways to power our lives, that are cleaner, more efficient, and more environmentally protective. Certainly at this time we must do it in ways that help our economy.

As we move forward, we must consider whether the RPS is the right policy at this time or whether perhaps it has been overtaken by the need to address climate change issues. If Congress chooses to impose the national standards, how can we make this work for all parts of the country? How do we handle the existing State programs that are already in place? How do we deal with the transmission impediments? What about the costs? I think, in this time

of economic crisis, we can't be asking people to choose between something as basic as energy and putting food on the table.

I thank you, Mr. Chairman, for the opportunity to have the first of these hearings. I think we'll get some good discussion, put some real meat on the bones of the issue. I look forward to the testimony of our witnesses today and to working with you as we move forward.

[The prepared statement of Senator Murkowski follows:]

PREPARED STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

Mr. Chairman, thank you for convening this hearing today. This is the first in a series of hearings the Energy Committee will conduct as we work to craft the third comprehensive energy bill in as many Congresses.

Because the Administration was unable to appear before us today, I'd like to thank Chairman Bingaman for agreeing to hold a second hearing on the RPS issue so the Department of Energy, and perhaps even FERC, can explain how this complicated program should be implemented, if enacted. I'd also like to hear from another panel of stakeholders at that time.

I know this is an important issue for the Chairman, who has been a long-time champion of a national Renewable Portfolio Standard. This was a new approach when the 107th Congress first began considering a renewable energy requirement for utilities. At that time, only a handful of states had such programs. Today, 29 states, plus the District of Columbia have fashioned their own renewable energy programs.

States, of course, are in a far better position than Congress to determine what resources and timetables work best for them. A one-size-fits-all national standard raises serious concerns with about regional disparities. While some parts of our nation are blessed with abundant renewable resources others-particularly the Southeast-lack renewable resources other than biomass needed to reach a 20% requirement. I have a number of questions on the feasibility of the Southeast using biomass as the sole means to meet this requirement, including the land use needs, carbon emissions, and environmental impacts.

We need to ask ourselves what we are trying to achieve with this program. Is our aim simply to increase renewable energy production? Or is the goal to reduce greenhouse gas emissions?

If so, it would seem that additional non-carbon emitting technologies should be included. Some point out that choosing specific technologies actually conflicts with the goals for a market-based carbon reduction program, such as cap and trade. One thing people do agree on is that the RPS, as drafted, is not a climate change solution.

Further, we cannot consider the RPS in a vacuum. We know that our existing transmission network is inadequate to support our environmental goals. If the necessary transmission is not put in place-and that means dealing with thorny siting, permitting and cost-allocation issues-it will be impossible to reach this new federal mandate and the customer will end up paying the cost of non-compliance.

We all agree that we must find ways to power our lives that are cleaner, more efficient, and of course, environmentally protective. And now we must do so in a way that helps right our economy.

So, as we go forward, we must consider whether the RPS is the right policy at this time or has it been overtaken by the need to address climate change issues? If Congress chooses to impose a national standard, how can we make this work for all parts of the country? How do we handle existing state programs? How do we deal with the transmission impediments? And what about the costs? In this economic crisis, we can't be asking people to choose between something as basic as energy and putting food on the table.

I'd like to thank all of our witnesses for joining us today. I look forward to hearing your testimony and getting your thoughts on the issues I have outlined. Mr. Chairman, thank you again for convening this important hearing.

The CHAIRMAN. Thank you very much.

We have five excellent witnesses today. One of our witnesses is from New Jersey, and Senator Menendez had asked to make that introduction.

Why don't you go ahead with that, and then I'll introduce the others.

Senator MENENDEZ. Thank you, Mr. Chairman, first of all, for holding this hearing, which I think is incredibly important, and for the privilege of introducing Dr. Ralph Izzo, who is the chairman of the board, the president, and the CEO of the Public Service Enterprise Group.

I didn't know you had that many titles, Ralph, so—I didn't.

PSEG is one of the Nation's ten largest energy companies in the Nation, and it's one of the most important subsidiaries as New Jersey's utility. As many on the committee may already know, New Jersey has an incredibly ambitious plan to reduce our carbon footprint, and perhaps the centerpiece of that plan is our State's renewable portfolio standard: 22.5 percent of New Jersey's electricity must come from renewable sources by 2021. We also have a specific carve-out for solar energy which requires 2.15 percent of all electricity to come from solar. The success New Jersey has achieved thus far from renewable energy is just the tip of the iceberg, due, in large part, to Dr. Izzo's commitment to help New Jersey meet its environmental standards.

Just today, his company announced that it is seeking approval for a new Solar 4 All Program to bring 120 megawatts of solar power directly to communities and customers throughout its service territory. That program will result in savings to municipal and county budgets, it will create hundreds of new jobs, and it will eliminate 1.7 million tons of CO₂ emissions, which is the equivalent of removing nearly 310,000 cars from the road for 1 year.

So, I could go on about Dr. Izzo's other efforts, but I think you'll hear from him. His leadership and experience in New Jersey should serve as a model for the Nation. I think, Mr. Chairman, only if we have energy producers and electric utility companies working alongside policymakers can we ever hope to achieve our shared vision of the Nation thriving on the economic growth of green industries and a Nation free of—independent of foreign energy sources. I really appreciate you having Dr. Izzo here today.

The CHAIRMAN. Thank you very much.

Let me just introduce our other four witnesses, and then we will hear from all of them before we ask questions.

Next is Don Furman, who is with Iberdrola Renewables, in Portland, Oregon—we're very pleased to have you; Commissioner David Wright, representing SEARUC, from Columbia, South Carolina—thank you for being here; Scott Jones is here—representing the Forest Landowners Association, in Atlanta; and Professor Lester Lave is here from Carnegie Mellon University, and has been very involved with the National Academies of Science, in their ongoing study, which we're looking for the results of very soon.

Dr. Izzo, why don't you start. If each of you could take 5 or 6 minutes and tell us the main points you think we need to understand, and then we will have questions.

STATEMENT OF RALPH IZZO, PRESIDENT, CHAIRMAN AND CEO, PUBLIC SERVICE ENTERPRISE GROUP, INC., NEWARK, NJ

Mr. IZZO. Thank you, Mr. Chairman, Senator Murkowski, Senator Menendez, and members of the committee.

As the Senator mentioned, our family of companies distributes electricity and natural gas to more than 2 million customers in New Jersey, and we own and operate approximately 17,000 megawatts of electric generating capacity, primarily in the Northeast, but also in the Mid-Atlantic and Texas.

I'm pleased to appear before you this morning to express my strong desire to see this Congress adopt a national renewable portfolio standard. I applaud you, Chairman Bingaman, for your leadership on this issue over many years, and I also recognize the leadership of my home-State Senator, Robert Menendez.

Global warming, in my opinion, is the most important environmental challenge of our time. To avoid catastrophic impacts from climate change, most scientists are telling us that we must achieve carbon emission reductions of 80 percent by 2050. To reach this target, we urgently need decisive Federal action; not a patchwork of State and regional fixes, but a strong, progressive national energy policy. An RPS is an essential component of such an energy policy, because it creates the demand for technologies that will transform the way in which we generate electricity. As we electrify transportation, it'll be even more important that renewable electric generation will become fundamental to our energy security.

Also with this policy, we will be creating jobs. We will develop new technologies that we can export all over the world. So, investment in renewable energy is a strategy for long-term growth. As an investor and as a businessman, I believe the adoption of a Federal RPS would create tremendous opportunities.

PSEG, our company, is already beginning to invest heavily in alternative energy. Today, as was mentioned, our utility filed a proposal with New Jersey regulators to invest almost \$800 million in solar generation over the next 5 years. This will include putting solar installations on brownfield sites, low-income housing, government buildings, and over 200,000 utility poles. But, we're not stopping there. We've also proposed, and are planning to develop, a 350-megawatt offshore wind farm, which would be located 16 miles off the coast of southern New Jersey. We recently created a joint venture to develop compressed-air storage facilities that can store energy from renewables and help make them more competitive. "Them," meaning the renewables.

A Federal RPS will send clear market signals to companies like ours to increase our investment in renewable electric generation. In the long term, these investments will be a net benefit to customers. In the short term, however, renewable energy is more expensive than fossil-fuel generation. We must be up front with consumers about these additional costs.

The most effective way to minimize costs, however, is through a national approach. A strong national program, such as the one being considered by this committee, will create economies of scale and drive down production costs. Once developers can rely upon a stable national market for renewable energy credits, it will reduce their risk and, therefore, reduce their cost of capital.

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

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

Mr. Chairman, I ask that my full written testimony be entered into the record.

Thank you, and I'd be pleased to answer any questions later.
[The prepared statement of Mr. Izzo follows:]

PREPARED STATEMENT OF RALPH IZZO, PRESIDENT, CHAIRMAN AND CEO, PUBLIC SERVICE ENTERPRISE GROUP, INC., NEWARK, NJ

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

I am pleased to appear before you this morning to express my strong desire to see this Congress adopt a national Renewable Portfolio Standard. I applaud you, Chairman Bingaman, for your leadership on this issue over many years, and I also recognize the leadership of my home-state Senator Robert Menendez.

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

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

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

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

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

Putting a price on carbon with a carbon cap-and-trade program is a crucial step toward achieving all three of these strategies. But we need a comprehensive package of policy solutions to achieve our goals. A federal RPS is an essential component of that package, targeted specifically at growing America's renewable energy industry. We cannot only focus on short-term, least-cost carbon reduction measures; we also need to create demand for technologies that will transform the way we generate electricity. And from an energy security perspective, it is crucial that we decarbonize our electric generation in tandem with efforts to electrify transportation.

With America's skilled workforce and entrepreneurial spirit, we should be leading this charge. But today we are playing catch up with other nations in developing renewable energy industries. A key factor that gives those countries a competitive advantage is a clear, pro-renewable energy policy.

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

As an investor and businessman, I believe the adoption of a federal RPS would create tremendous opportunities. PSEG is already beginning to invest heavily in alternative energy. Today, our utility filed a proposal with New Jersey regulators to invest almost \$800 million in solar generation over the next five years. This will include putting solar generation on brownfields, low-income housing and govern-

ment buildings. It also will include roughly 200,000 solar installations on top of our utility poles. This is in addition to the more than \$100 million our utility is already investing in solar generation.

Our merchant renewable generating company is also developing solar, offshore wind and other alternative energy projects. Most notable among these is a joint venture with Deepwater Wind to build a 350 megawatt wind generation facility roughly 17 miles off the coast of South Jersey. This project will use a patented technology that allows us to locate wind farms in deep water, virtually out of sight from the shore. We also recently created a joint venture called Energy Storage and Power to develop compressed air storage facilities that can store energy. This technology can be paired with intermittent renewable generation resources to make them more reliable and competitive.

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

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

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

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

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

For example, New Jersey has an RPS that must be met with renewable energy generated within PJM, our regional electric grid. Energy from a wind farm in Illinois may count, but energy from a wind farm in Nebraska does not count, even though it may be a more affordable compliance option. Once a strong federal program is in place, state policymakers may decide that making that distinction no longer makes sense for their ratepayers.

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

Let me address a few more specifics in the latest draft RPS legislation. The target of 20 percent by 2021 is consistent with the target set by New Jersey. It is aggressive but achievable, and the alternative compliance mechanism of 3 cents per kilowatt hour provides reasonable assurance that costs will not spiral out of control ahead of technological breakthroughs.

I also appreciate the effort to promote small distributed generation by awarding it triple federal credits. However, by defining distributed generation as being "at a customer site," you may exclude certain types, such as the solar panels on utility poles that we are proposing to install. We think a small change in the definition could address this issue.

As for the inclusion of energy efficiency as a compliance mechanism, I believe the RPS should be used exclusively to promote renewable energy. Investments in conservation and efficiency are crucial, as they are currently the most affordable way to reduce carbon emissions. But Congress should promote energy efficiency through separate initiatives rather than allowing investment in efficiency to displace investment in renewables. Given the steep decreases in carbon emissions that we must make over the next 40 years, we need to pursue both efficiency and renewables at full speed.

In addition, it is worth noting that certain emerging renewable technologies will need additional federal incentives, particularly through the tax code. A market driv-

en approach like the RPS will appropriately drive investment toward what are currently the most cost-competitive forms of renewable generation. However, developing promising industries, like solar and offshore wind, is an important part of our long-term climate change solution.

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

In closing, Mr. Chairman, as you know, America faces daunting challenges. We must reduce carbon emissions 80% by 2050. We must transform our energy economy and establish America as the world's leader in innovative and clean energy technologies. And as the Senate considers the American Reinvestment and Recovery Act this week, we face rising unemployment and an unprecedented economic crisis. We can begin to address all of these challenges by implementing a strong, national RPS program and sending a clear signal to investors that a true shift has occurred in our approach to national energy policy. Let us encourage sustainable investments to power our way out of this economic downturn. The time to act is now.

The CHAIRMAN. Thank you very much. We will include everyone's full statement in the record.

Mr. Furman, go right ahead.

STATEMENT OF DONALD N. FURMAN, SENIOR VICE PRESIDENT FOR DEVELOPMENT, TRANSMISSION, AND POLICY, IBERDROLA RENEWABLES, INC., PORTLAND, OR

Mr. FURMAN. Mr. Chairman, Senator Murkowski, and the committee, thank you again for the opportunity to appear before you.

I'm senior vice president of transmission development and policy for Iberdrola Renewables. We're a United States corporation headquartered in Portland, Oregon. We're the second largest developer and operator of wind farms in the United States. We're also actively developing solar and biomass facilities. In 2008 alone, we invested over \$2 billion just in wind-generating facilities in the United States. I'm here, obviously perhaps, to urge the support and the passage of a national RPS.

There are three benefits that we see to a national RPS. Depending on what's playing in the papers on any point in time, one may surge to the front, in terms of being most important, but they're all solid reasons for doing it.

The first one is economic. In 2008, the wind industry in this country built 8,000 megawatts of wind—in excess of 8,000 megawatts—\$17 billion invested, 35,000 jobs. That is a good, positive thing that happened, and those effects lasted all the way through the end of 2008 and are continuing into 2009.

The RPS has been estimated to create, if passed in its current form as proposed, 185,000 new jobs, \$66 billion in new investment. This is all according to a study by the Union for Concerned Scientists. So, it's an economic stimulative package that involves investment, not just spending money on things that won't yield a return, but on long-term investment.

The benefits are the next two reasons—the benefits of those investments. Equally important, in my view, is national security. If you look at the last 10 to 15 years in this country, we have built largely natural-gas-fired generation in order to meet our growing needs. Natural gas is a good way to generate electricity. It's flexi-

ble. There are many benefits to it. But, we have a limited supply. At some point, we will start to run out of domestic supplies. Guess who owns most of the world's natural gas? It's people who don't like us very much. So, this is, in my view, a national security imperative, that we find ways, and start planning for that time in the future when our domestic supplies start to wane and we do begin to seriously import liquified natural gas. I think it's essential to our way of life. Energy is such an important part of our economy, it is essential that we get ahead of that.

The third obvious benefit is environmental. This is not the sole solution to global—to climate change and to carbon, but it is a major component to it, and there's no reason not to get started on it today. EIA estimates 15 percent RPS would result in 3 billion tons of carbon reduction. That's substantial. That is a substantial amount of carbon. UCS estimates that 20-percent RPS would be the equivalent of taking \$36 million—36 million cars off the road. So, it is a substantial part of dealing with carbon.

There are several arguments against the RPS; we've heard some of them already. One of them is that it's discriminatory, in terms of regions of the country. I don't think nothing could be further from the truth. The whole purpose of an RPS is to create a trading system that will allow you to trade renewable rights. The idea behind that is, essentially, to have a single price. Everybody will pay the same price. That's an important component. A lot has been made about wealth transfer, and I don't think that holds water at all.

Second, higher prices. Perhaps, in the very short term. But, an RPS, as was pointed out by Dr. Izzo, will actually drive prices down as we achieve economies of scale. More importantly, particularly for the wind business, which is going to be where the bulk of the compliance comes from—wind is a logistically driven business. If you don't—if you have high transportation costs, if you're not manufacturing, domestically and locally, you're going to have high costs, and that's one of the reasons it's more expensive. An RPS will give companies the incentives to invest in manufacturing facilities, locally.

The last argument is that it should be done by the States. I think it's clear that results in a Balkanized system. It's a compliance nightmare for utilities. It's very, very difficult.

In terms of the current draft, I've included in my testimony a number of things that—including a number of maps that demonstrate that there is renewable energy across this country. There's substantial biomass in the Southeast, there is a lot of ability to comply at a reasonable level.

The current draft—we've pointed out, in my written testimony, a number of things—I would call out energy efficiency, though, as an important thing that we think ought to be done first. Utilities ought to start with energy efficiency, but it ought not to be put in this bill, because it will create an accounting nightmare.

I will conclude my remarks by noting that I testified before this committee in favor of an RPS 4 years ago, and at that time I was employed by—it was a different part of my life, and I was employed by, actually, the largest coal-burning utility west of the Mississippi. The reasons I testified for the RPS then are the same reasons as

I'm testifying now and that I urge its support. The difference is, the urgency is far greater.

Thank you for this opportunity to speak, and I'd ask that my written comments be included in the record. Thank you, Mr. Chairman, for the opportunity.

[The prepared statement of Mr. Furman follows:]

PREPARED STATEMENT OF DONALD N. FURMAN, SENIOR VICE PRESIDENT FOR DEVELOPMENT, TRANSMISSION, AND POLICY, IBERDROLA RENEWABLES, INC., PORTLAND, OR

Mr. Chairman, Senator Murkowski and members of the Committee, thank you for the opportunity to appear before you today and thank you for holding this important hearing. My name is Don Furman. I am Senior Vice President for Development, Transmission, and Policy for Iberdrola Renewables, Inc. Iberdrola Renewables is a U.S. corporation¹, headquartered in Portland, Oregon. We are America's second-largest developer and operator of wind energy generating facilities. We also are engaged in the development and operation of solar and biomass generating facilities and other energy activities. In 2008, alone, Iberdrola Renewables invested more than \$2 billion in energy projects located throughout the country.

The purpose of my testimony is to urge the Congress to enact national renewable portfolio standard (RPS) legislation. Mr. Chairman, Iberdrola Renewables appreciates your leadership in promoting a national RPS over the years. We would not be close to enacting this legislation without your commitment and persistence. The time has arrived for the House and Senate to send to the President a robust RPS bill that will help expand the economy, protect the environment, reduce consumer energy costs and enhance our national security.

President Obama's New Energy for America Plan calls for an RPS that "ensures 10 percent of our electricity comes from renewable sources by 2012, and 25 percent by 2025." While these targets might appear ambitious, they are certainly achievable. Last year, the Department of Energy issued a report concluding that, if certain barriers are eliminated, wind energy alone could provide up to 20 percent of the nation's electricity supply by 2030. Other renewable energy technologies including solar, biomass and geothermal also have the potential to produce substantial amounts of electricity in the near-term, if the proper policies are adopted.

BENEFITS OF RENEWABLE ENERGY DEPLOYMENT

A national RPS, by increasing the deployment of renewable electric generation capacity, will produce enormous economic benefits. Until recently, renewable energy had been one of the few bright spots in the U.S. economy. In 2008, more than 8,000 MW of wind power capacity (accounting for 42% of all new electric capacity additions) was installed in the United States. This activity created an additional \$17 billion in investment and 35,000 jobs throughout the economy²—and not just in states hosting wind farms. For example, at least three manufacturers have announced plans to build windmill blade and turbine manufacturing facilities in Arkansas—investing approximately \$300 million and adding more than 2,000 jobs to the State's economy. Enactment of a national RPS would be a significant boost for the economy. According to a 2007 analysis prepared by the Union of Concerned Scientists, a 20 percent national RPS, by itself, would create 185,000 new jobs and generate approximately \$66 billion in new capital investment.³

An increased reliance on renewable energy to power our homes and businesses would also substantially reduce the emission of greenhouse gases and other harmful pollutants. The Energy Information Administration (EIA) in 2007 concluded that a 15 percent national RPS would reduce carbon dioxide emissions by 3 billion tons.⁴ The Union of Concerned Scientists estimates that a 20 percent RPS would amount to the emissions reduction equivalent of removing 36.4 million cars from the road.⁵

¹ Iberdrola Renewables is an affiliate of Iberdrola Renovables—the world's largest wind power generator with operations in more than 20 countries.

² "Wind Generation Grows by Record 8,300 MW in 2008", American Wind Energy Association Press Release (January 27, 2009).

³ "Cashing In On Clean Energy", Union of Concerned Scientists (July 12, 2007).

⁴ "Impact of a 15-Percent Renewable Portfolio Standard", Energy Information Administration (June, 2007).

⁵ "Cashing In On Clean Energy", Union of Concerned Scientists (July 12, 2007).

The increased deployment of renewable energy will also enhance our national energy security. The electric generation sector in the U.S. has become dangerously reliant on natural gas. According to the EIA, natural gas-fired facilities are expected to account for approximately half of all electric generation capacity additions over the next four years.⁶ Although domestic natural gas production has risen, it is unlikely to maintain pace with demand. This will raise gas prices and increase our reliance on liquefied natural gas (LNG) imported from countries that aren't necessarily friendly with the United States. In fact, natural gas exporting countries from unstable parts of the world, including Russia and Iran, recently held discussions aimed at forming an OPEC-style cartel. Mr. Chairman, Americans can not afford to be subjected to another international energy cartel. Renewable energy can act as an important hedge—reducing overall gas demand and limiting our reliance on natural gas imports. According to a 2007 report prepared by Wood Mackenzie—a firm that does consulting work for the natural gas industry—a 15 percent national RPS would reduce natural gas demand by three bcf per day and lower U.S. natural gas prices by more than 15 percent.⁷

A NATIONAL RPS IS URGENTLY NEEDED

Today, the only significant incentives for renewable energy development are located in the tax code—the renewable production tax credit (PTC), the solar investment tax credit (ITC) and accelerated depreciation (MACRS). These tax incentives have been successful to a point. However, they have also led to a substantial amount of uncertainty that has, at times, inhibited investment in renewable generation and blocked the development of a domestic renewable energy manufacturing base.

The PTC, which was first enacted in 1992, has expired on three different occasions and has neared expiration several other times. When Congress has extended the PTC, the extensions have always been for short time horizons. Until recently, the ITC had suffered a similarly inconsistent history. This uncertainty has inhibited long term planning for renewable project developers. In addition, it has limited investment in a domestic manufacturing base. The vast majority of renewable energy equipment is still manufactured overseas, often using technology developed here.

The ongoing congressional debate on the economic stimulus package over the relief necessary to enable renewable energy developers to use existing renewable energy tax incentives illustrates the urgent need for enactment of a national RPS. Because they operate very capital intensive businesses, most renewable energy developers do not have sufficient taxable incomes to directly utilize these tax incentives. As a result, they have been forced to enter into Internal Revenue Service-sanctioned “tax equity partnerships” with companies that had large amounts of taxable income—primarily very large financial institutions. These arrangements were grossly inefficient—Wall Street intermediaries ended up with up to 30 percent of the value of the renewable energy tax incentives, at the expense of renewable energy projects and consumers.

The recent collapse of a large number of financial service companies has virtually eliminated even that avenue for renewable energy developers to utilize the PTC, ITC and MACRS. Unless action is taken by Congress soon, investment in new renewable energy capacity in 2009 and 2010 is expected to decline dramatically—costing upwards of 100,000 jobs. The renewable energy industry is hopeful that the economic stimulus bill will provide some temporary relief to enable renewable energy developers to monetize renewable energy tax incentives.

This, of course, begs the question: why are we using an inefficient tax policy to accomplish a goal that is critical to our security and of strategic importance to our future as a nation? A national RPS will provide a simple, direct signal to the market place that will drive renewable energy development and eventually obviate the need for the PTC. By establishing a market for renewable energy over a reasonable period, a national RPS would provide the long-term certainty that is essential for developing a vibrant domestic renewable energy industry.

OPPONENTS' ARGUMENTS ARE UNCONVINCING

Mr. Chairman, we are encouraged that the concept of a national RPS is growing in popularity, even among electric utilities. On January 30, nine publicly-owned and investor-owned utilities (representing diverse regions and generation sources) were among a group of companies that signed a letter to President Obama's Chief of Staff

⁶“Planned Nameplate Capacity Additions from New Generators by Energy Source”, Energy Information Administration (www.eia.doe.gov/cneaf/electricity/epa/epat2p4.html).

⁷“The Impact of a Federal Renewable Portfolio Standard”, Wood Mackenzie (February, 2007).

urging the enactment of national RPS. There remain, however, a number of opponents that continue to make the same tired, old arguments, no matter how many times they are refuted. These arguments are pure sophistry.

First, critics argue that a national RPS will discriminate against states that don't have substantial wind power resources. However, this ignores the fact that a variety of renewable technologies would be eligible for RPS compliance. As the attached maps demonstrate, each region of the country is blessed with substantial amounts of renewable resources. For years, opponents of a national RPS have mockingly referred to it as a "wind portfolio standard". However, the EIA, in analyzing previous national RPS proposals considered in the House and Senate, has consistently concluded that biomass energy, not wind, would benefit the most and that solar power would also receive a substantial amount of renewable energy credits.⁸ EIA has also concluded that utilities in the Southeastern U.S.—a region with limited wind power potential—would have access to a substantial amount of renewable energy in order to comply with a national RPS.

Utilities could also economically comply with a national RPS through renewable energy generated in other states. For instance, a proposed transmission expansion plan by the Southwest Power Pool is expected to bring the Southeast significant wind power resources from the central plains. Moreover, by establishing a national renewable energy credit (REC) trading market and enabling utilities to comply through the acquisition of RECs, a national RPS will ensure that the most cost effective renewable energy facilities will be deployed. Many of the naysayers that argue that a statute causing a utility to purchase renewable energy or RECs associated with renewable energy generated elsewhere somehow would amount to a regional wealth transfer, are the same utilities that currently import large amounts of coal and uranium mined thousands of miles away. The fact is that our nation has always been heavily dependent on interregional transfers of energy to ensure reliability and benefit consumers.

Second, opponents claim that a national RPS will dramatically raise energy prices. However, the facts don't bear that out. According to Wood Mackenzie, a 15 percent national RPS, because it significantly reduces the demand for natural gas and thus the price of electricity generated with gas, would cause electricity costs to decline by approximately \$240 billion over 20 years.⁹ Further, EIA's analysis of a 15 percent national RPS proposal considered in the previous Congress concluded that overall it would cause consumer energy costs to rise by less than one-half of one percent over a 25 year period.¹⁰ Now that EIA is forecasting higher natural gas prices over the long term, an updated analysis will likely demonstrate greater savings.

Third, some suggest that RPS programs are better left for the states to consider and administer individually. Twenty seven states have adopted their own renewable portfolio standard programs. These state programs have helped create markets for renewable energy. However, the state programs have their limitations. Some state RPS programs are better designed than others. It is not yet clear whether some of these state programs will actually cause much additional renewable generation to be built. In addition, certain states have erected barriers to renewable energy generated in other states, eliminating the efficiencies that come from interstate trading of renewable energy and the development of a national REC market. Moreover, certain states are unlikely to promote the development of a significant amount of renewable energy. A national RPS (supplemented by state programs that exceed the national floor) is the only policy that can ensure the development of significant amounts of renewable energy in the most cost effective manner.

Finally, certain opponents argue that Congress should focus instead on the adoption of a greenhouse gas cap-and-trade regime because a national RPS would not do enough to prevent climate change. While it is true that the RPS would not obviate the need for greenhouse gas regulation, the fact is that it will likely take some time before a greenhouse gas regulatory scheme actually causes a significant shift in the electric generation resource mix. Renewable energy and energy efficiency are the only available mechanisms for reducing emissions in the near-term. In addition, as I have already noted, a national RPS produces other benefits (both economic and security-related) beyond the reduction of greenhouse gas emissions.

⁸See e.g., "Impacts of a 15-Percent Renewable Portfolio Standard", Energy Information Administration (June, 2007); "Energy and Economic Impacts of Implementing Both a 25-Percent Renewable Portfolio Standard and a 25-Percent Renewable Fuel Standard by 2025", Energy Information Administration (August, 2007).

⁹"The Impact of a Federal Renewable Portfolio Standard", Wood MacKenzie (February, 2007).

¹⁰"Impact of a 15-Percent Renewable Portfolio Standard", Energy Information Administration (June, 2007).

COMMENTS ON DRAFT RPS PROPOSAL

Mr. Chairman, I would like to take a moment to comment on the draft national RPS legislation you recently circulated. This legislation would help promote a vibrant domestic renewable energy industry and we urge the Committee to favorably report the bill, with some modifications.

First, it is important that a national RPS bill contain compliance requirements that are achievable, yet ambitious enough to lead to greater investments in renewable energy. The draft legislation requires utilities regulated under the provision to meet an RPS target that begins at 4 percent in 2011 and ramps-up to 20 percent by 2021 and remains at 20 percent through 2039. On their own, these targets may appear to be reasonable. However, the legislation includes a number of provisions that would have the effect of reducing overall renewable generation levels. For instance, utilities with retail sales of less than 4 million megawatt-hours would be exempted. In addition, utilities would deduct sales of hydropower and power generated from municipal solid waste before calculating the level of renewable energy required to comply with the Act. Moreover, in some cases utilities will be able to use energy efficiency to meet up to 25 percent of their renewable energy requirement. Finally, distributed generation facilities that utilize renewable resources and renewable generation located on tribal land would be eligible for credit multipliers. Although these provisions may be necessary to meet other public policy objectives, they could significantly reduce the overall renewable energy target. We urge that the RPS compliance targets be strengthened to account for these exceptions.

The draft RPS legislation would permit utilities, if their governors so petition, to use energy efficiency credits to comply with up to 25 percent of their RPS obligations. Energy efficiency should always be the first resource option for every utility and efficiency certainly should be encouraged as much as possible. However, issuing energy efficiency credits for “qualified energy savings” and permitting those credits to be utilized for RPS compliance could be problematic. It is very simple to determine when a kilowatt-hour of renewable electricity is generated. It is far more complicated to determine when an action leads to an actual reduction of energy use and how much energy savings are actually achieved directly as a result of that action. For instance, the energy efficiency provisions of the draft RPS bill arguably would provide a factory owner with efficiency credits if the owner shuts down a factory due to the economic downturn. We believe that Congress should seek to encourage and require energy efficiency actions outside of the context of RPS legislation.

We also believe that the funds received by the government would be better used if they were allocated back to utilities in the proportion those utilities submitted Federal Renewable Energy Credits in compliance with the bill. Such a provision, which is included in the Markey-Platts RPS bill that was recently introduced in the House, would further encourage utility compliance with the RPS through the generation of renewable energy and the acquisition of RECs rather than by making an alternative compliance payment. This concept is similar to an approach utilized in Great Britain’s RPS program.

Mr. Chairman, I want to briefly address a separate, but related, subject—electric transmission. Many sites with good wind, solar and geothermal resources are located great distances from load centers. Many of these sites aren’t being developed because of insufficient transmission capacity to enable the power to be transported to consumers. Congress, by enacting, a national RPS, will help incent utilities to build additional amounts of transmission to allow them to access the most cost effective sources of renewable energy. However, more needs to be done. The current patchwork of regulatory responsibility over the planning and siting of transmission facilities and the allocation of the costs associated with those facilities has proven ineffective. We urge this Committee to also enact legislation that would provide a greater role for the Federal government to address the current regulatory impediments to the development of much needed interstate transmission designed to access renewable energy.

Mr. Chairman, this concludes my prepared presentation.

The CHAIRMAN. Thank you very much.

Mr. Wright—Commissioner Wright, go right ahead.

STATEMENT OF DAVID A. WRIGHT, CHAIRMAN, SOUTHEASTERN ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS, COLUMBIA, SC

Mr. WRIGHT. Thank you. My name is David Wright, and I’m a commissioner with the South Carolina Public Service Commission.

Before I start, I'd like to thank the committee and thank the staff, both Jean and Kelly, for the job they did in assisting us, getting us ready on such short notice. So, thank you, and please pass that along to them.

As regulators in the SEARUC region, we are responsible for ensuring that retail electricity customers receive safe, reasonably priced, reliable electric service. We believe establishing a uniform national renewable portfolio standard without regard to crucial regional differences will drive up electricity costs unnecessarily, jeopardize reliability, and divert capital needed to achieve aggressive carbon targets.

Federal policy should give States the flexibility to promote renewable energy in a way that doesn't undercut the higher priority of reducing carbon emissions cost-effectively.

South Carolina, for example, does not possess a wealth of renewable energy sources, such as the abundant solar energy that is available to States in the desert Southwest, the wind-turbine generation available to States located in the Great Plains, or hydro generation in the Pacific Northwest. As a result, my State and our region must seek to encourage the growth of research and development in the use of renewable sources that are available and economically viable to provide for our future needs.

During many of the earlier years covered in the discussion draft RPS, we still have to continue our reliance on conventional baseload-generation sources, including new nuclear energy, to ensure that reliable, reasonably priced electricity is available to all of our citizens.

As for solar power—with the current technology, solar has a low capacity factor, takes significant space, and is not always available during times of greatest need. In my State, we've had testimony that as much as 90 percent of any wind or solar power would have to be backed up with conventional generation sources. Electricity consumers want power even when the sun is not shining and the wind is not blowing.

Because the availability and cost-effectiveness of traditional renewable energy sources vary so widely among States and regions, the SEARUC States believe that decisions regarding renewable energy portfolios should be left to the States. While we do urge Congress to support renewables, if you should decide to adopt an RPS mandate, we also ask that you carefully craft it to be practically achievable on a State-by-State basis. An RPS should be based on what a State can possibly achieve if it employs its best efforts to promote renewable generation.

Some States are truly blessed with renewable resources, others are not. As the SEARUC region, we wish to emphasize that the aim of Federal energy legislation should not be to transfer wealth from one region of our Nation to another through the enforced purchase of renewable energy credits, or RECs. A very large concern for the SEARUC region is that the money used to purchase the RECs and alternate compliance payments will leave our States and our region, the very areas that need the money most. A one-size-fits-all Federal RPS would hit consumers hard in the Southeast, the region with the least renewable resources and the greatest poverty. Electricity customers would have to pay an expensive pre-

mium on top of higher costs that will come with meeting carbon targets. For instance, in my State we have one of the lowest income levels in the U.S., and one of the highest unemployment levels, and many of them live in mobile homes and other energy-inefficient housing. These low-income households are truly unable to participate in any energy efficiency and conservation efforts, which greatly limit our ability to achieve the proposed RPS or conservation goals.

Because they live in energy-inefficient housing, their consumption rate of electricity is higher, and, naturally, so is their bill for electricity. A sad fact is, the only time they conserve is when they're forced to, when their power is shut off for inability to pay the bill.

This is an important reason why we believe the money in the utility—i.e., the ratepayer—pays for RECs, and alternate compliance payments should not leave the State. The money should be re-invested in the State where it was paid, to develop and implement energy efficiency programs, to help low-income households, and to help make these renewable technologies more affordable.

The energy policy report recently prepared and released by our public utilities review committee concluded that renewable resources would provide about 4 percent of South Carolina's generation by 2027. That would leave us—if you assume that we could get 5 percent from conservation and efficiency, it would leave us 11 percent short of the proposed 20-percent RPS by 2020. Others in our region will face the same fate.

North Carolina is the only State in the SEARUC region that has adopted and is operating under an RPS, a 12-and-a-half-percent RPS by 2021, with 40 percent of that total being allowed to come from energy efficiency. Regulators there have told me that if the national RPS were adopted as it is proposed in this discussion draft, the-cent kilowatt-hour alternate compliance payment alone would more than double the current cost to their customers.

I was taught that you should not criticize something unless you are prepared to offer an alternative solution. With that in mind, I would ask that you and the Congress strongly consider doing exactly what was done in the Energy Policy Act of 2005, when you charged public utility commissions across this Nation with setting standards for net metering and smart metering. Before moving forward with a national renewable portfolio standard, first give States a chance by charging those State public utility commissions across this Nation who do not have a renewable portfolio standard in place with creating such a standard. Like EAct 2005 legislation, give commissions a deadline to get it done and in place. I know your goal is not to penalize anyone. Please move slowly on this issue and consider my suggestion to allow States to adopt and address their standards.

Thank you for your time today, and it's truly an honor to be here.
[The prepared statement of Mr. Wright follows:]

PREPARED STATEMENT OF DAVID A. WRIGHT, CHAIRMAN, SOUTHEASTERN,
ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS, COLUMBIA, SC

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

My name is David Wright. I am a legislatively elected Commissioner of the South Carolina Public Service Commission. I am here today as Chairman of the ten member states that comprise the Southeastern Association of Regulatory Utility Commissioners (SEARUC), a regional association of the National Association of Regulatory Utility Commissioners (NARUC). I am also representing my state commission and myself as a South Carolina Commissioner.

As regulators, my fellow commissioners and I in the SEARUC region are responsible for ensuring that retail electricity customers receive safe, reasonably priced, reliable electric service. We are concerned that a uniform, federal Renewable Portfolio Standard (RPS) mandate fails to recognize that there are significant differences among the states in terms of available and cost-effective renewable energy resources, and that having such a standard in energy legislation will ultimately increase consumers' electricity bills.

Establishing a uniform national RPS, without regard to crucial regional differences, unnecessarily drives up electricity costs, jeopardizes reliability, and diverts capital needed to achieve aggressive carbon targets. If we are going to have renewable portfolio standards, they should be politically sustainable, and take into account what best efforts can achieve in each state, given its potential for renewable energy. Federal policy should give states the flexibility to promote renewable energy in a way that doesn't undercut the higher priority of reducing carbon emissions cost-effectively.

Some regions of the country have unique renewable energy sources, like geothermal. Not all states are fortunate enough to have abundant traditional renewable energy resources, such as wind, or have them located close enough to the load center to render them cost-effective. The Southeast and large parts of the Midwest certainly face this circumstance.

In particular, my state, South Carolina, does not possess a wealth of renewable energy sources, such as the abundant solar energy that is available to states in the Desert Southwest, the wind turbine generation available to states located in the Great Plains, or the hydro generation in the Pacific Northwest. As a result, my state, and our region, must seek to encourage the growth of research and development in the use of renewable resources that are available and economically viable to provide for our future needs. During the earlier years covered in the discussion draft being considered we will also have to continue our reliance on conventional base load generation sources including new nuclear energy to ensure that reliable, reasonably priced, electricity is available to all of our citizens.

Even in regions of the country that do have access to wind energy, there frequently is stiff local opposition to building huge wind turbines, significant costs for the additional transmission needed, and reliability concerns. As a result, some renewable wind energy projects do not get built, while others take years to build.

As for solar power, with the current technology, it has a low capacity factor, takes significant space, and is not always available during times of greatest need. In my state, we have had testimony that as much as 90% of any wind or solar power would have to be backed up with conventional generation sources. Electricity consumers want power even when the sun is not shining and the wind is not blowing.

Because the availability and cost-effectiveness of traditional renewable energy resources varies so widely among states and regions, the SEARUC states believe that decisions regarding renewable energy portfolios should be left to the states. Renewable energy is touted as a way to achieve energy independence, reduce green house gas emissions and reduce our carbon footprint. All of these are admirable goals.

But what is it that the country really needs? Is it energy independence? Is it a reduced carbon footprint? Is it greenhouse gas-free energy? Like many, I believe it makes sense to do the best we can to achieve all of the above. But at what price? Additionally, to remove political influences, or the artificial 'feel-good' nature a RPS might bring, you should consider relying on sound science as you craft a policy. By this I mean, the claims of trade groups or others who are promoting specific renewable technologies should be proven by sound scientific principles, using independent scientific methodology in a transparent way. The claims should be able to proven and reproducible others.

After so many years of not having a real national energy policy, we're now in great danger of establishing a national policy that is doomed to failure—with a re-

newables policy and climate policy at cross-purposes. Consumers and our economy will pay a heavy price for the unintended consequences.

While we agree with the overall goals as stated above, and urge Congress to support renewables, we also ask that you carefully craft any RPS mandate to be practically achievable on a state-by-state basis. Because of the differences in availability of renewable resources, some states' "best efforts" in developing renewables may produce results much lower than those that are practically achievable in other states. As the SEARUC region, we wish to emphasize that the aim of federal energy legislation should not be to transfer wealth from one region of our nation to another through the enforced purchase of Renewable Energy Credits, or RECs.

Quite honestly, the utilities in my region will not be able to meet the renewable portfolio standard as set forth in this legislation. Instead, in order to achieve compliance, they will be forced to write very large checks for the RECs, money that will come from our ratepayers, and the money will leave our region where it is needed most. This will be a very significant dollar amount, too.

As attachments to my testimony, I have included sources, links, memos, articles and letters from states in the SEARUC region to support my testimony.* Public Utility Commissions and Commissioners throughout the SEARUC region all tell me the same thing. While all of our states strongly support renewable and alternative energy generation, we do not support a federally mandated one-size-fits-all Renewable Portfolio Standard. As regulators and public officials, our statutory charge is to ensure safe, reasonably priced, and reliable electric service. We are concerned that a federally mandated RPS that fails to account for differences in regional and local characteristics could increase the cost of service for all consumers and businesses who use and pay for electricity and could reduce reliability, while providing no incentive for investment in our states or benefit to the customers in return for those higher bills.

Although the states in the SEARUC region do not support a 'one-size-fits-all' national renewable portfolio standard, we do support the growth of renewables. It is my hope that the Congress will recognize that there are truly significant differences in the availability of renewable resources from state to state. Some states are truly blessed. Others are not.

I was brought up to believe that you should not criticize or complain about something unless you were prepared to offer an alternative or a solution.

With that in mind, I would ask you that you and the Congress strongly consider doing exactly what was done in the Energy Policy Act of 2005, when you charged public utility commissions across this nation with setting standards for net metering and smart metering within a set period of time.

I would ask that, before you move forward with a national Renewable Portfolio Standard, you first give the states a chance by charging those state public utility commissions across this nation that do not already have a Renewable Portfolio Standard in place with creating such a standard. And, like in the EPACT 2005 legislation, give our state commissions a certain period of time to get it done and in place. Each state's RPS should recognize its renewable resource potential and should push for a best-achievable RPS within a given period of time. If a utility fails to meet the state standard, a penalty or compliance payment would have to be made to the state. That money would stay in the state where it would be invested in re-

*The following documents listed have been retained in committee files: Ryan H. Wisner—The Treatment of solar Electricity in Renewables Portfolio Standards; Wood Mackenzie—North America Gas & Power: Balancing CO₂ Goals with Gas & Power Market Conditions; Wood Mackenzie—The Impact of a Federal Renewable Portfolio Standard; The Southeastern United States Can Benefit from a National Renewable Electricity Standard; Impacts of a 15-Percent Renewable Portfolio Standard; Commissioner WRIGHT—Appendices A–H; Estimate by Arkansas Electric Coops of Impact of RPS Legislation on All Arkansas Consumers; Estimate by Arkansas Electric Coops of Impact of RPS Legislation on All Arkansas' Electric Cooperatives; Analysis of cost of Renewables for Arkansas; Analysis of Cost of Renewables for Arkansas' Cooperatives; Senator Bingaman's Renewable Portfolio Standard Discussion Draft; Sources and LINKS; Estimates by Entergy for Entergy Arkansas and All of Arkansas Consumers; Estimate by Entergy For Entergy Utility Service Area; RX FOR RPS: ADDRESSING THE REGIONAL DISPARITIES; Florida PSC Response to Information Request; Letter to Senator Martinez; Electricity Modernization Act of 2005; Lester B. Lave—A National Renewable Portfolio Standard; Not Practical; Letter from MARUC; Udall/Platts RPS Amendment; NARUC's Position on Legislation Establishing a Federal RPS Program; State of North Carolina Utilities Commission Raleigh; North Carolina comprehensive Energy legislation key Messages; Key Points—2007 Promote Renewables Energy and Energy Efficiency Act Securing the Right Energy Future for North Carolina; Annual Report of the North Carolina Utilities Commission; Net Electric Generation by Fuel Source by SEARUC State; Robert Michaels—A Federal Renewable Electricity Requirement What's Not to Like; National Renewable Portfolio Standard: Smart Policy or Misguided Gesture? RPS Effect on Arkansas' Cooperatives Annual Cost and Sales.

newable technology or to developing and implementing energy efficiency programs for low-income households living in mobile homes or other energy-inefficient housing. Any utility that meets a state standard would be deemed to be in compliance with any federal requirement.

North Carolina is the only state in the SEARUC region that has adopted, and is operating under, a renewable portfolio standard. After many studies and hearings on the subject, North Carolina adopted a 12.5% RPS by 2021 with 40 percent of that total being allowed to come from energy efficiency. But, North Carolina also adopted a cost cap. Regulators there have told me that if the national RPS were adopted as it is proposed in the discussion draft being considered today, the \$0.03 cents/kwh alternate compliance payment alone would more than double the current cost to their customers. Florida is another state that is working through and toward a renewable energy policy. The Florida Public Utilities Commission is currently studying the issues and is consulting with the state legislature.

A very large concern for my state and the SEARUC region is that the money used to purchase the REC's and alternate compliance payments will leave our states and our region, the very areas that need the money the most.

Let me explain why I say that. A 'one-size-fits-all' federal RPS would hit consumers hard in the Southeast, the region with the least renewable resources and the greatest poverty. Electricity customers would have to pay an expensive premium on top of the higher costs that will come with meeting carbon targets.

South Carolina has one of the lowest income levels in the United States and one of the highest unemployment levels. Our workers' average annual salary is \$27,560, compared to a national average of \$33,000. There are a significant number of households living at the poverty level and below in South Carolina, as in much of the Southeast, and many of them live in mobile homes or other energy-inefficient housing. These people are proud, but they are poor.

Literacy levels are low in South Carolina, and pose a significant obstacle to our meeting the energy efficiency component of an RPS. Statistics indicate that South Carolina has high student dropout rates and the majority of residents have some degree of illiteracy. South Carolina has the 4th highest percentage of adults at Level 1 or 2 in the country. More than half (56%) of our state's residents fall within severe (Level 1) to moderate (Level 2) ranges of illiteracy (level 1 is the lowest literacy level. Adults in this category can perform simple tasks with text and documents, but display difficulty using certain reading, writing, and computational skills considered necessary for functioning in everyday life. Adults at literacy level 2 can begin to compare and contrast but are unable to perform higher level reading and problem solving skills.) If people cannot read or write, they will have a difficult time comprehending information about energy efficiency and conservation.

These low-income households are truly unable to participate in any energy efficiency and conservation efforts, which greatly limits our ability to achieve the proposed RPS or conservation goals. But these people still must heat their homes. Because they live in energy-inefficient housing, their consumption rate of electricity is higher and, naturally, so is their bill for electricity, compared to the figures for occupants of more well insulated energy efficient homes. A sad fact is, the only time they 'conserve' is when they are forced to: when their power is shut off for inability to pay their bill.

South Carolina ranks 40th among in the country in median income, and 44th in disposable income. Many of our citizens simply can't afford weather stripping for the front door, much less energy-efficient windows or an energy-efficient heating unit. They may want to conserve, to make their homes energy efficient, to buy that Energy Star refrigerator, but they can't. They have to settle for that \$100 used refrigerator, if they can afford it, or have to decide how to pay their power bill and buy groceries for the family. This is not an exaggeration.

A better way would be to provide incentives for the use of, or integration of, renewable technologies into a company's existing portfolio, instead of penalizing them, and ratepayers, for a failure to meet an arbitrary standard. The money a utility (i.e. the ratepayer) pays for REC's and alternate compliance payments should not leave the state. The money should be re-invested in the state where it was paid to develop and implement energy efficiency programs to help low-income households, and to help make these renewable technologies more affordable.

In the proposed national RPS, development of sources of renewable energy would have to cost less than \$0.03 cents/kWh to avoid paying the alternate compliance payment or it would be wasted money, meaning it would be cheaper to make the alternate compliance payment than to develop renewables and energy efficiency technologies. In a recent hearing before the South Carolina Public Service Commission, an witness testified that ". . . PV solar's cost of energy ranges from 31 cents per kWh to over 44 cents per kWh." Wind resources in the South Carolina and the

Southeast that may be suitable for wind generation are primarily located along the coast which is subject to hurricanes. No offshore wind turbines currently exist in the United States. A proposed offshore wind farm in Delaware recently bid to supply generation to Delmarva Power & Light for about 13–14 cent per kWh. I do not know whether this is a busbar cost or a delivered cost. However, I do know that it is above the current average residential retail rate for electricity in South Carolina which is about 10 cents per kWh.

The Energy Policy Report recently prepared and released by the Public Utilities Review Committee concluded that renewable resources would provide about 4% of South Carolina's generation by 2027. Assuming that South Carolina could achieve the 5% conservation and efficiency limit and 4% of electric generation from renewable by 2020, the utilities in South Carolina would fall 11% short of the proposed 20% RPS in 2020. Based on the 2007 total South Carolina generation reported by the Energy Information Agency and the proposed 3 cents per kWh Alternative Compliance Payment, South Carolina ratepayers would be subject to an annual Alternative Compliance Payment of more than \$270 million. This amount is in addition to the added cost of generation from renewable resources compared to the cost of generation from conventional resources. It is also possible that a civil penalty of 6 cents per kWh could be assessed on all or part of the 11% shortfall in meeting the proposed RPS. From my view as a state regulatory commissioner, there are other issues or possible unintended consequences to consider as well. If I am to balance the needs of the utility against the needs of the ratepayer, where is the regulatory tipping point?

As a regulator, how am I to treat a utility, and protect the ratepayer, in a rate proceeding when they have had to spend money to try and meet an RPS, and had to spend additional money to pay a penalty for not being able to meet the RPS, when what they really need is serious baseload generation to meet customer demand for electricity and a nuclear reactor is the least-cost generation source for them to meet the demand? An arbitrary national Renewable Portfolio Standard will hamper me as a regulator in being able to do the job I am charged to do. And I say that even before mentioning anything about the economic impact possible climate legislation or carbon legislation will have on ratepayers. As elected representatives of your states' citizens, you carry a heavy burden. But, your constituents trust you to do the right thing. I have followed some of your careers very closely and I have the honor of knowing some of you personally. I know your goal is not to penalize anyone. Please move slowly on this issue. In the meantime, also consider my suggestion to require the state utility commissions to address and adopt a renewable portfolio standard before you do something that may have serious unintended consequences.

Senators, thank you for your time today. It is truly an honor to be here. I look forward to answering any questions that you may have, either today or, should you prefer, in writing to the Committee in the coming weeks.

The CHAIRMAN. Thank you for your comments.
Mr. Jones, go right ahead.

STATEMENT OF SCOTT P. JONES, EXECUTIVE VICE PRESIDENT, FOREST LANDOWNERS ASSOCIATION, ATLANTA, GA

Mr. JONES. Chairman Bingaman and Ranking Member Murkowski, members of the committee, thank you for the opportunity to appear before you and speak about the implications of a renewable electricity standard for America's family forest owners.

Today, I will talk with you about family forest owners and the practicalities they face in trying to hold forestlands as forests. Specifically, will family forest owners sell wood, or will they sell real estate? Without forestland, there can be no forest resources, such as clean water, clean air, wildlife habitat, and wood-based commodities.

I am Scott Jones. I'm a private forest landowner and executive vice president of the Forest Landowners Association.

Today, 60 percent of the commercial forestland in the United States is owned by almost 11 million private forest landowners, and we are under increasing pressure to convert forestland to other

uses. Family forest owners need new markets for wood, and you can help by creating renewable energy opportunities for America. Woody biomass must include all wood crops, in all forms and sizes. The use of woody biomass as a renewable energy source will provide needed markets for private forest landowners and contribute to forest health by creating economic incentives to deter conversion of forestland to other uses.

In a mosaic of energy sources across the U.S., we seek a level playing field for wood, but we are concerned that forestland may be disproportionately burdened by well-meaning, but functionally stifling, regulation relative to other renewable energy sources. Wood is a reliable feedstock without the seasonal fluctuations or serendipity of weather that inhibits some other energy sources, and the resource is available now.

In January 1905, the New York Times headline read, “Timber Famine Near, Says President Roosevelt.” The article said that, “This country is in peril of timber famine.” Unless the forest can be made ready to meet the vast demands which growth will inevitably bring, commercial disaster is inevitable. Remember, at this time, pulpwood was nonexistent, since Charles Herty had not yet invented the pulping process. Only when we planted trees and encouraged markets did we end our brush with a timber famine. The point here is, markets cured the timber famine. Forest management for commodities did that. New markets did not create sustainability problems, they cured them.

You may have heard that adding a new RES market to existing markets will create an unsustainable resource. This is simply not true. We do not have enough markets for the wood that we are growing. 2007 Forest Service data shows 41 percent volume grown over removal in our country. The reduction in the forest products manufacturing not only affects the amount of wood grown, but is a threat to the perpetuation of forest landowners.

Traditional markets for forest commodities are moving offshore. As fewer and fewer pulp and paper mills remain in this country, production has remained unchanged or slightly improved, but geographic distribution and access to these markets have degenerated.

A few numbers to show the degeneration of the markets: 136 pulp and paper mills were closed between 1997 and 2007, and none have been built since 1989; 331 softwood saw mills closed in the U.S. and Canada, 1995 to 2007—and I know some in your districts have seen some recent closures; 314 furniture plants closed between 2000 and 2008.

The incentive for forest landowners to convert forestland investments to residential and commercial real estate are led by population growth of nearly 30 percent by 2030, according to the United States Census Bureau. Projections by the Forest Service are that 19 million acres of forestland will be developed to other uses between 1992 and 2020 in the Southeast. Again, I’m distinguishing between sustainable forestland, sustainable forest resources, and note that, without the land, there can be no resources.

In legislation and regulation, if we are truly to meet a—renewable energy goals, wood must be allowed to make its full contribution. Currently, 92 percent of our Nation’s forestland is natural. However, with the current definition of “renewable biomass” in the

renewable fuel standards at its most restrictive, America's natural private forestlands are excluded. That's 92 percent of our forestlands excluded from the renewable fuel standard. This kind of policy creates disincentives to continue to hold and manage forestlands. Federal forest policy must address the conundrum of what will motivate a forest landowner to continue to hold their investment. No definition that harms capital investment in energy facilities or takes the siting of these facilities can benefit the future of America's forestlands. Without broad, inclusive definitions for "woody biomass," we're only encouraging the loss of private forestlands to other uses that are typically not as environmentally friendly.

In conclusion, we believe we can help construct an approach that addresses concerns about environmental sideboards without—appropriately relying on existing practices and capabilities. However, the inclusion of a shadow Federal forest practice act is not the purpose of a renewable portfolio standard, or any energy bill. America's forest landowners already operate under, and comply with, some of the most strenuous environmental laws and regulations on the globe. With inclusive language for wood in the renewable electricity standard is the place—is in place, the Forest Landowners Association will use our resources, including our grassroots networks, to promote legislation that fairly includes the use of wood biomass to meet our Nation's energy needs. In fact, we've already begun working with land-based allies and the environmentalist community in an effort to address any forest health pressures that may arise from new energy wood markets.

I thank the chairman, ranking member, and the members of the committee for the opportunity to have made these comments on behalf of the Forest Landowners Association. This concludes my remarks.

[The prepared statement of Mr. Jones follows:]

PREPARED STATEMENT OF SCOTT P. JONES, EXECUTIVE VICE PRESIDENT, FOREST LANDOWNERS ASSOCIATION, ATLANTA, GA

RE: The Renewable Electricity Standard: Implications for Sustaining Family Forests¹

Chairman Bingaman, Ranking Member Murkowski, Members of the Committee, thank you for the opportunity to appear before you to speak about the implications of a Renewable Electricity Standard (RES) for America's family forest owners. Today, I will talk with you about nonindustrial, private forest landowners and the practicalities they face in trying to hold forestlands as forests; that is, how will RES markets, energy markets in general, and other market trends affect landowner inclinations to keep forestland? More specifically, will family forest owners sell wood or will they sell real estate? We stipulate—throughout this testimony—that we distinguish between forestland and forest resources. Without forestland, there can be no forest resources: clean water, clean air, wildlife habitat, healthy soils, aesthetics, recreation, and wood-based commodities. For example, the state of Georgia loses roughly 219 acres of forestland every single day to other uses.²

Many of you have spent a lot of time on this issue and we in the forestry community appreciate it.

I am Scott P. Jones, Executive Vice President of the Forest Landowners Association (FLA), a national association that supports and protects the interests of private forest landowners. I am a graduate of the University of Georgia, with a Bachelor

¹ See the final pages for "Points of this Testimony"

² Harper, R.A., N. McClure, and T.G. Johnson, et al. Georgia's Possessive Forests, 2004. U.S. Department of Agriculture, Forest Service, Southern Research Station. Asheville, NC.

of Science in Forest Resources, a nationally certified forester, a Georgia Registered Forester, and a forest landowner.

Since 1941, FLA has provided its members with education, information, and national grassroots advocacy. FLA's outreach on behalf of private forest landowners nationwide enhances their forestland management practices and stewardship.

According to the USDA Forest Service's Forest Inventory and Analysis program³, about 60 percent of the commercial forestland in the U.S. is owned by almost 11 million private forest landowners (I understand that there are about 2 million farmers in the U.S.). This does not include manufacturers, it does not include Real Estate Investment Trusts, and it does not include Timberland Investment and Management Organizations⁴. It is the "Moms and Pops"; it is us. And we are under more pressure to convert forestland to other uses than in any other time in history, and that pressure will increase.

FLA members look forward to participating in the new markets created by developing opportunities to meet national renewable energy requirements and we wish to do this while maintaining forest health. We support the increased use of alternative energy feedstocks, in particular "woody biomass," to help feed our nation's needs for energy; thereby, amongst the benefits, help to end a troubling reliance on other countries that supply energy for our homes, for our economy, for our people. To aid in this increased use, statutory and regulatory definitions of woody biomass, as a full partner with other cellulosic feedstocks, should include all wood-crops, in all forms and sizes, in addition to residues, wastes, and byproducts of processing. The use of woody biomass as a renewable energy source will provide new markets for private forest landowners and, in so doing, contribute to forest health by removing hazardous wildfire fuels, speeding recovery from natural disasters, alleviating vegetative-competition that contributes to pest and pathogens infestations, and creating economic incentives to deter conversion of forestland to other uses.

Forest landowners are highly interested in the production of alternative energy feedstocks from trees, and as segments of the forest products industry continues to trend offshore, new markets can help to answer the question raised about whether forest landowners will sell trees or sell real estate.

We believe that wood is necessary to meet a Renewable Electricity Standard. In a mosaic of energy sources, where each region of the country produces energy from its own, best indigenous resources, we seek a level playing field for wood. This level field-of-play will bring the same jobs and new local tax bases to forested regions as other regions will potentially enjoy.

Biomass, in general, has unique attributes among other renewable energy sources. It can be burned in existing coal-fired power production with relatively minor and inexpensive modifications, and it can be generated whenever the biomass developer or utility chooses.

But, we have deep concern that, under developing renewable energy markets, forestland may be disproportionately burdened by well-meaning but functionally stifling regulation, relative to other renewable energy sources and their land bases. Simple acknowledgements of the impracticality of applying agricultural principles to forestry is a small step in the right direction; for example, the seasonal-crop, closed-loop approach to energy feedstocks just has no place in dealing with a crop that can take decades to culture; i.e., trees. The negative impacts of national energy policies could create harm to all family forestlands in the U.S. Wood is a reliable feedstock, without the seasonal fluctuations or serendipity of weather that inhibit some other energy sources. And this resource is available now.

In January 1905, the New York Times headline read, "TIMBER FAMINE NEAR, SAYS PRESIDENT ROOSEVELT". The article said that " . . . this country is in peril of a timber famine . . ." as asserted by the President this afternoon in an address before the American Forest Congress. In the course of his remarks the President said: 'If the present rate of forest destruction is allowed to continue, a timber famine is obviously inevitable. Fire, wasteful and destructive forms of lumbering, and legitimate use are together destroying our forest resources far more rapidly than they are being replaced . . . Unless the forests can be made ready to meet the vast demands which . . . growth will inevitably bring, commercial disaster is inevitable.'⁵

Here are the words straight from the Times. I think this forcefully makes the case for sustainability. Remember, pulpwood was non-existent when this quote was made, as Charles Herty (1867-1937) had not yet invented the pulping process. Only

³"Forest Landscapes in Perspective" USDA Forest Service, p. 173

⁴"Forest Resources of the United States" USDA Forest Service

⁵New York Times, Jan. 6, 1905; <http://query.nytimes.com/gst/abstract.html?res=940DE4DE133AE733A25755C0A9679C946497D6CF>

when we planted trees and encouraged markets did we end our brush with a timber famine. The destructive form of lumbering, then, was a process that is still called “high grading” trees, today. Because at that time, only a high quality part of the tree was considered valuable for lumber, and the rest of the tree was left in the woods to rot or was burned. The point here is: markets cured the “timber famine”. Forest management for commodities did that. New markets did not create sustainability problems; they cured them.

In the United States, timber growth has exceeded the harvests since 1952. Growing-stock volume on U.S. timberland has increased 39 percent between 1953 and 2002. That is, the nation’s forest inventory accrued more volume than it lost by mortality and harvest by over one-third.⁶ Today, you will likely hear that adding a new RES market to existing markets will create an unsustainable resource. It is simply not true. We do not have enough markets for the wood that we are growing, as shown in the USDA Forest Services Resource Planning Act (RPA) data collected by the Forest Inventory Analysis program. The 2002 data showed that across all species in the United States, we were growing 34 percent more volume than we removed⁷. Now, with the reduction of forest products manufacturing, we have seen an increase in the amount of growth versus removal. The 2007 RPA data shows a 41 percent volume grown over removal⁸. The impact of the reduction of our forest products manufacturing is having a clear effect on the amount of wood being grown and the threat to the health of our forests and private forest landowners is eminent. We believe arguments to the contrary are likely disingenuous and perhaps more motivated by competition for raw materials and/or feedstock preferences and/or tax avoidance than resource sustainability. The forest resource is sustainable and this question has been asked and answered before. But, the willingness of forest landowners to maintain forestland as forestland has had too little attention. Federal forest policy must address the conundrum of what would motivate a forest landowner to continue to hold that investment when it is threatened by new and evolving forces; whether it is opportunities for better financial returns for their families, shrinking market access, or investment-dampening legislation and regulation.

Urbanization will have the “most direct, immediate and permanent” effects on southern forests of all forces of change.⁹ The incentives for forest landowners to convert forestland investments to residential and commercial real estate are led by population growth. U.S. Census Bureau¹⁰ population growth projections between the years 2000 and 2030 are for 82.1 million new people. That is a 29.2 percent growth, and most of that growth will be in the regions heavily dominated by private forest ownership.¹¹

How will this growth affect forestland use? We are distinguishing—again, throughout this testimony—between sustainable forestland, sustainable forest resources, and that without the land there can be no resources. Nineteen million acres of forest converted to developed uses from 1992 to 2020 in the Southeast.¹² The need for homes, churches, public infrastructure, and other services of 21st century human existence will cause fragmentation of forested landscapes, which will have its greatest impact in the Southeast,¹³ the region with the highest concentration of family forestland, but with a lack of other regional sources of renewable energy other than forests. And private, family forest landowners who manage smaller tracts of land are at greater potential for development.¹⁴

Traditional markets for forest commodities are trending offshore or are impacted by poor trade policy. For example, as fewer and fewer pulp/paper mills remain in this country, production has remained unchanged—or slightly improved—but, geographic distribution and access to those markets has degenerated.

- 136 pulp and/or paper mills closed, 1997–2007 (none have been built since 1989)¹⁵

⁶“Report on Terms Used in Biomass Credit Legislation” BioResource Management, Inc., Richard Schroeder May 21, 2007

⁷2002 Forest Resources of the United States, 2002. Gen. Tech Rep. NC-241, Table 36

⁸Forest Resources of the United States, 2007. Gen. Tech Rep. NC-xxx, Table 36 (with permission from Greg Reams, National Program Manager, F.I.A.)

⁹Wear and Greis, USDA Forest Service, Southern Forest Resource Assessment.

¹⁰US Census Bureau Interim Projections Released April 2005.

¹¹Susan Stein, et. al., USDA Forest Service, “Forest on the Edge”.

¹²David Wear, USDA Forest Service, Southern Forest Resource Assessment.

¹³Susan Stein, et. al. USDA Forest Service, Forests on the Edge.

¹⁴Butler and Leatherberry, 2004. America’s family forest owners. *Journal of Forestry* 102 (7): 4-9.

¹⁵American Forest & Paper Association, 2007

- 331 softwood sawmills closed in the U.S. & Canada, 1995–2007¹⁶
- 314 furniture plants closed, 2000–2008 (hardwood indicator)¹⁷

In legislation and regulation, if we are truly to meet renewable energy goals (whether electricity or biofuels), wood must be allowed to make its full contribution. Some well-meaning organizations want renewable energy, but want to dictate which forests can participate. Currently, 92 percent of our nation's private forestland is natural. In the southeastern United States, on private lands, 88 percent of forestland is natural. However, with the current definition of "renewable biomass" for the Renewable Fuels Standard of the 2007 Energy Independence and Security Act (at its most restrictive), America's natural private forestlands are excluded from participation in the initiative to establish a renewable fuels industry. This kind of policy creates disincentives for private forest landowners to continue to hold and manage their forestlands. Anecdotally, we know that this 2007 language has already resulted in acres and acres of tree removals for conversion to other land uses. This same definition will result, we believe, in land dedicated to fuel production at the expense of other traditional markets.

In order to promote the continuation of sustainably managed forests on private lands, we must encourage markets for these landowners; voluntary markets. No definition that harms capital investment in energy facilities or taints the siting of those facilities can benefit the future of America's forestlands. Without broad, inclusive definitions for woody biomass, we are only encouraging the loss of private forestlands to other uses that typically are less environmentally friendly.

So, our growing population leads to conversion. Fewer markets and less market access leads to conversion. And the constraints of new laws lead to conversion. The message is that constraints on the resource lead to conversion of forestland to other uses. How can one argue that disincentives to keep an investment—in this instance, privately held forestland—improve the likelihood of its continuance or its sustainability?

Then, it is in the best interest of all who want to maintain a forested America to seek out incentives for forest landowners. The highest current concern to these landowners regards the definition of "woody biomass" in statute and regulation. That is, woody biomass should be defined as "wood" in addition to wood residues, wastes, and/or byproducts. Ultimately, we must sustainably harvest trees as pulpwood, sawtimber, poles, pilings, chip-n-saw, OSB, wafferboard, and "energy-wood." Landowners would like to see wood as an equal partner with grains, grasses, and all cellulosic feedstocks.

The inclusion of a "shadow" federal forest practices act is not the purpose of a Renewable Portfolio Standard or any energy bill. American forest landowners already operate under and comply with some of the most strenuous environmental laws and regulations on the globe. Forest practice policies are better determined at the local level to account for differences in local conditions and needs rather than through prescriptive, one-size-fits-all federal mandates.

In addition to reducing our dependence on traditional fuels and their finite availability, we hope to see increased production of clean alternative energy products; products that we are told are environmentally cleaner than traditional products. Wood energy sources are also renewable, abundant, and economically competitive.

An incentive-based approach, working within the market system, would create new opportunities and incentives for forest landowners, as segments of the forest products industry and associated markets trend toward an offshore future and other pressures to convert amass. At this time, 24 states and the District of Columbia have enacted laws to require alternative energy feedstocks—Renewable Portfolio Standards—for electric power production. A similar national commitment to incentives for energy production from alternative feedstock would contribute mightily to energy production and secure forestland investments with the surety, security, and certainty of a nation committed to long-term alternative energy production and maintaining family forestlands. These forest lands require a long term commitment. Most family forest landowners will only see one or two harvest in their lifetime. America needs landowners confident in their forestland investments, so that these owners continue to see forestland as competitive and to deter forest conversions to other uses.

In conclusion, we believe we can help construct an approach that addresses concerns about environmental sideboards, while appropriately relying on existing practices and capabilities. With inclusive language for wood in the Renewable Electricity Standard in place, the Forest Landowners Association will use our resources, includ-

¹⁶USDA, Profile 2007: Softwood Sawmills in the US and Canada

¹⁷George Barrett, Hardwood Review

ing our grassroots networks, to promote legislation that fairly includes the use of wood biomass to meet our nation's energy needs. In fact, we have already begun work with land-based allies and with the environmentalist community in an effort to address any forest health pressures that may arise from new energy-wood markets.

Now to offer an answer to the question of whether landowners will sell wood or sell real estate: we've got it, let's use it.

I thank the Chairman, the Ranking member, and the Members of the Committee for the opportunity to have made these comments on behalf of the members of the Forest Landowners Association. This concludes my remarks. I would be glad to respond to any questions that any member of the committee may have and, later, deliver materials and information that may help to further clarify our position.

Points of this Testimony:

- Forest Landowners Association members look forward to participating in the new markets created by developing opportunities to meet national renewable energy requirements and we wish to do this while maintaining forest health.
- New markets for forest landowners will help sustain forestland and curtail conversions.
- FLA opposes the creation of a federal forest practices and/or land-use act.
- FLA is prepared to help craft good legislation.
- Trees are an abundant, sustainable, renewable, and reliable energy source.
- A few are using an argument of "threat to sustainability," which we believe disingenuous and perhaps more motivated by competition for raw materials and/or feedstock preferences and/or tax avoidance.
- Wood is necessary to meet the standard.
- FLA is prepared to help pass well-crafted legislation.
- Make wood an equal partner with other cellulosic feedstocks and the lands producing them.
- FLA is currently working with allies, including the environmentalist community, to address any forest health pressures that may arise from this new market.

The CHAIRMAN. Thank you very much.
Dr. Lave, go right ahead.

STATEMENT OF LESTER B. LAVE, UNIVERSITY PROFESSOR, HIGGINS PROFESSOR OF ECONOMICS & PROFESSOR OF ENGINEERING & PUBLIC POLICY, CARNEGIE MELLON UNIVERSITY, PITTSBURGH, PA

Mr. LAVE. Chairman Bingaman, Ranking Member Murkowski, and members of the committee, thank you for giving me the opportunity to testify on this important legislation.

At Carnegie Mellon University, I'm a senior professor in the Business Engineering and H. John Heinz Colleges. Granger Morgan and I direct the Electricity Industry Center, and I'm director of the Green Design Institute. I have the privilege of serving on two National Academy of Sciences Committees that Chairman Bingaman requested to take a look at America's energy future. The opinions here are strictly my own.

Chairman Bingaman, as I listened to your remarks, to the remarks of Senator Murkowski and Senator Menendez, as I've listened to the remarks of the other people here, I heard a lot of goodwill. I heard people of goodwill who are trying to solve a problem. So, I think we're agreeing on what the goals are. I'm here to try and testify on how to achieve those goals in the smartest possible way with the least disruption.

I think that the legislation here is good legislation in pushing us in this direction, but I would recommend two changes to it.

The first is, I think that the definition of "efficiency" is not quite as tight as it should be. I think it ought to be tightened. Then,

after that, I don't see a reason to restrict how much efficiency can contribute to this.

The second is, as we've been hearing from other people, I'm most concerned about carbon dioxide emissions when we talk about electricity, and I think that's what our focus ought to be.

In doing that, I think that we ought to avoid the mistakes that we made in the 1970s, which is to have either Congress or the Department of Energy choose the winning technologies. I think that we need to let the engineers and entrepreneurs find out what are the winning technologies, whatever they might be, in contrast to what happened in the 1970s; the winning technologies turned out to not be the ones that people were sure would actually turn out.

I praise your emphasis on efficiency in the legislation. It's clearly our cheapest energy resource. I praise your support of distributed generation and combined heat and power. I agree that, in the long run, renewables will provide our energy. But, I think that we have to be careful not to pick the technology that we think is going to win. I think that we ought to be trying to face the issues more directly.

So, let me start off with carbon dioxide. The world has about 5 billion tons of fossil fuels. We've burned about 6 percent of that. If we were to burn any substantial portion of that without carbon capture and sequestration, we would certainly have major global climate change. In order to avoid that, I think it is necessary, not just to take a look at a 15- or 20- or even 30-percent renewable portfolio standard, we need to address carbon. It's—if you had a 20-percent renewable portfolio standard, that would still leave 80 percent of the electricity that could be generating CO₂ and causing other problems. So, it's not that I'm arguing that we ought to have a higher standard, it is that we ought to be addressing that problem most directly.

I distributed some maps of wind and solar resources. There have been some good comments on wind, so I will not talk about that, but let me talk about the solar stuff. Again, I'm trying to talk about how to achieve our goals in the smartest, most cost-effective way.

When you look at those maps, Senator Bingaman, your State comes out really well. The desert Southwest does very well on this. As you get further north and as you get further east, the solar resource goes down. So, I love solar, but if you're trying to do solar in a place that doesn't have very many solar resources, then you're going to wind up demonstrating that we're doing something that is expensive and doesn't make a lot of sense. So, again, I praise you for not having a solar set-aside here, but I think that, when we think about this, we ought to be thinking about it in a hardheaded way, not just in terms of what it is that we think ought to be very good.

So, in my written testimony, I've emphasized what are some of the difficulties of having renewable resources. I don't mean that in a mean-spirited way; I mean that those are really the difficulties that we have to overcome.

So, just finally here, Senator Bingaman, I commend you for this important legislation. I want to emphasize that we want to have as much flexibility as possible. So, I have two recommendations. One is to tighten the definition of "efficiency" and let it contribute

much more to the standard. The second is to focus on reducing carbon dioxide rather than singling out renewables as the answer.

Thank you very much for the opportunity to testify, and I'd be happy to answer any questions.

[The prepared statement of Mr. Lave follows:]

PREPARED STATEMENT OF LESTER B. LAVE, UNIVERSITY PROFESSOR, HIGGINS PROFESSOR OF ECONOMICS & PROFESSOR OF ENGINEERING & PUBLIC POLICY, CARNEGIE MELLON UNIVERSITY, PITTSBURGH, PA

Chairman Bingaman, Ranking Member Murkowski, and members of this committee. Thank you for giving me the opportunity to testify on this important legislation.

At Carnegie Mellon University, I am a senior faculty member in the Business, Engineering, and H. John Heinz colleges. Granger Morgan and I direct the Electricity Industry Center and I am director of the Director Green Design Institute. I have the privilege of serving on two National Academy of Sciences committee studying energy issues. The opinions here are mine and do not necessarily reflect the views of my coauthors, Carnegie Mellon University, or any other institution.

I praise the draft legislation and recommend that you:

1. Tighten the definition of efficiency and eliminate the limit on its contribution. This will allow regions that don't have good wind and solar resources to meet the legislative goals at lower cost.
2. Focus on reducing carbon-dioxide emissions rather than singling out renewables as the answer. There are significant savings from letting all technologies compete in satisfying the goals of lowering greenhouse gas emissions, increasing environmental quality more generally, increasing energy security, and improving sustainability,

I commend you for Title VIII-Renewable Portfolio Standard. The basic approach is sound and well thought out. I share your goals of reducing greenhouse gas emissions, improving environmental quality more generally, making our energy supply more sustainable, enhancing energy security, and of ensuring that energy prices are not so high that they derail the economy or prevent Americans from living well. I praise your emphasis on efficiency, our cheapest energy "resource" and your support of distributed generation and combined heat and power. I agree that in the long term, renewable fuels will likely provide our energy. Finally, I commend you for generally trying to eschew picking the winning technologies. Let engineers and entrepreneurs find the best way of meeting the goals.

Unfortunately, there are significant difficulties and costs in implementing a federal RPS. While the industry struggles to meet your goal of a 20% RPS by 2039, 80% of generation could be emitting carbon-dioxide, polluting the air and water, and using imported oil and natural gas. My point is not that the RPS should be higher, but rather that the legislation should address the issues directly.

My greatest concern for electricity generation is abating carbon-dioxide emissions. Without controls, we will run out of atmosphere before we run out of fossil fuels. The world has 5,000 billion tons of fossil fuels, of which we have used only 6%. Burning any appreciable fraction of the coal, oil, and natural gas resources will send atmospheric carbon dioxide concentrations to far greater levels than humans have experienced and lead to major global climate change. Global climate change, not our stock of fossil fuels limits how much electricity we can generate from these fuels.

A carbon portfolio standard (CPS) would address this concern directly and more effectively. The available renewables technologies have quite different carbon emissions; giving equal credit to all doesn't make sense. Other technologies also have low carbon emissions and should receive attention.

The maps I have provided of wind and solar resources show vast differences among states. For example, the Southeast has neither good wind nor solar resources. It does have biomass, but that will be needed for producing liquid fuels. The legislation should give each region the greatest flexibility to achieve the goals at least cost, including focusing on renewables or conservation, fossil fuels with carbon capture and sequestration (CCS), and nuclear.

I emphasize efficiency since it has no emissions of air or water pollution, no greenhouse gas emissions, and does not harm the environment. After tightening the definition of efficiency in the draft legislation, I see no reason to limit efficiency's contribution to 25%. The efficiency definition should include distributed generation and combined heat and power, since their virtue stems from increased efficiency, not

merely from having such a program. The energy efficiency accomplishments in states, such as California and New York, show a vast potential for efficiency, one greater than the likely contribution of renewables. Electricity use per capita in these two states is 40% less than the national average, twice the RPS goal for 2039. I recommend aggressive goals for energy efficiency, particularly in regions such as the Southeast that have poor wind and solar resources.

Achieving the increases mandated in the bill requires building large amounts of transmission from areas with good wind resources to population centers. Many people like wind turbines in the abstract but don't want them as neighbors, for example, the proposed wind farm off Cape Cod. More people oppose transmission lines. If the wind farms and transmission lines can be sited, there are likely to be delays of ten years or more, particularly for transmission.

Trading renewable credits will be limited by the combination of transmission constraints and the fact that the best wind resources are located far from population centers. If the excellent wind resources in the upper Midwest and Rocky Mountains cannot be exported, the local populations could use only a small proportion of the generation potential.

For large amounts of wind and solar to enter the grid, there must be inexpensive bulk storage of electricity. R&D into technologies such as compressed air is needed. Until bulk storage is possible, integrating more than 15% wind and solar power into the system will be costly and could compromise reliability.

I now summarize the difficulty of integrating large amount of wind and solar energy into the electricity grid.

As you know, wind and solar generation differ from the traditional ways of generating electricity because they are generally not available when we need power. Wind turbines and solar arrays generate electricity when the wind blows and the sun shines. One of the best solar sites in the USA is in the Sonora Desert in Arizona. A very large solar site there had a capacity factor of 19%, out of the possible 100%, if it had generated full power every hour of the year. Wind turbines have higher potential in good wind sites but, for example, the average capacity factor for the wind turbines in Texas was only 26% in 2006.

The solar map shows that the good sites are in the desert Southwest. Sites in the Southeast have lower potential because of cloud cover. The rest of the continental USA has much lower potential for generating solar power, particularly the most heavily populated areas. The capacity factor is important because almost all the costs are in manufacturing and installing the array. Thus, a solar array with a capacity factor of 20% would produce electricity at half the cost of an array with a capacity factor of 10%. Forcing solar installations into the areas where most Americans reside would consume a vast amount of resources per kilowatt-hour.

Nature is more generous in distributing good wind sites around the nation, but they are still distant from population centers. In particular, note that there are no good wind sites in the Southeast. As with solar, the cost of produced power is inversely related to the capacity factor since almost all the costs are building the wind farm. Thus a site with a capacity factor of 40% would have half the cost per kilowatt-hour as a site with a 20% capacity factor.

In general wind and solar power are not available when demand is highest. Wind tends to be strongest at night and lowest in the summer. Solar power is best in the summer, but the Arizona data show that the arrays have all but stopped producing electricity by 5 PM in the summer, just as demand is hitting its peak.

Another problem is that wind and solar generation are variable. Wind speed changes from moment to moment and clouds block the sun, even in the desert. This intermittent power challenges the grid to provide reliable, high quality power when wind and solar are contributing more than 5-10% of total generation.

One solution to both these problems is to store large amounts of electricity when these sources are generating so that it can smooth power output and have that output available when demand is high. Pumped hydro storage is the best way to store electricity, but few new sites are available. Compressed air storage looks promising, but is expensive and less efficient than pumped hydro.

Wind farms can affect climate just downwind, reducing precipitation. Massive reliance on wind energy would take energy out of the wind, changing the Earth Climate.

With present technology, the unreliability of generation from wind and solar means that reliable generation must backup every kilowatt-hour. A solar array or wind farm may not generate power for days because of a storm or lack of wind. Since we still want electricity, fossil fuel or hydro power must be available. A General Electric study for Texas found that even in windy April, there were hours when the wind farms were producing almost no power, requiring a rapid switch to natural gas turbines. Since this occurred during one of the windiest months, imagine the dif-

difficulties during the summer months when the demand for electricity peaks and wind resources are small.

The point is that wind and solar can lower the amount of fossil fuels used for generation, but they don't lessen the need for reliable generation capacity. For new coal generation with carbon capture and sequestration, and for new nuclear generators, the capital cost is the vast majority of new costs and so the savings are small.

I have focused my remarks on wind and solar, but there are other renewables. Hydroelectric dams generate six times as much power today as the other renewables, but there is little prospect for getting significantly more power. Dams are being torn down, not being built. Geothermal provides power in California and more is planned for the Southwest. Run of the river hydro could provide small amounts of power. Biomass could provide significant amounts of power at competitive costs, but there is a limited amount of land and the biomass is better used for transportation fuels. Where there are good geothermal resources, this resource can be attractive. However, the good areas are limited to the West. Ocean currents and waves can provide power, but corrosion and withstanding storms make the power expensive, in addition to other problems.

In good sites, wind power is competitive with new fossil generation with carbon capture and sequestration. Even at the best sites, solar photovoltaic generation is several times the cost of wind per kilowatt-hour. Japan engaged in a massive program of subsidizing solar; Germany is currently engaged in huge subsidies. While clever in many ways, the Japanese and Germans don't seem to understand that extracting power from sunlight, when there is relatively little sunlight, is expensive. The solar map shows that trying to generate solar power in most of the USA would be extremely expensive. At good sites, solar thermal power is almost competitive with new fossil generation.

This catalogue of difficulties should not be regarded as mean-spirited objections. Rather, my intent is to set out the problems that need to be solved. We agree that our energy supply must be made sustainable; we must reduce greenhouse gas emissions, enhance energy security, and produce energy at a cost that will not derail our economy.

America's largest fossil fuel resource is coal; we will rely on coal for much of our energy in the coming decades. In particular, coal will continue to provide most base-load electricity generation. It is essential that demonstration coal plants with carbon capture be built to improve the technology and that DOE shows that massive underground injection of carbon-dioxide in a range of geological strata can sequester the carbon without leakage. It is also essential that we build half a dozen nuclear plants using the new technology to assess their costs and performance.

While solar photovoltaic power is too expensive for massive deployment, I urge funding solar photovoltaics research, since this technology will ultimately provide most of our energy. I also recommend R&D funding for bulk electricity storage, such as compressed air.

Chairman Bingaman, I commend you for this bill. I particularly commend you for not trying to identify the technology winners, such as through a solar mandate. I hope that you can make two changes:

1. Tighten the definition of efficiency and eliminate the limit on its contribution. This will allow regions that don't have good wind and solar resources to comply at lower cost.
2. Focus on reducing carbon-dioxide rather than singling out renewables as the answer. There are significant savings from letting all technologies compete in satisfying the goals of lowering greenhouse gas emissions, increasing environmental quality more generally, increasing energy security, and improving sustainability, ensuring that energy prices are not so high that they derail the economy.

Thank you for the opportunity to testify on this important legislation. I would be happy to answer any questions.

The CHAIRMAN. Thank you. Thank you all for your excellent testimony. Let me start with a few questions.

Dr. Izzo, you've indicated that New Jersey has an aggressive solar program. Dr. Lave just indicated that he thinks having a carve-out for solar doesn't make good sense, given the variations in solar resources around the country. You have a carve-out for solar in New Jersey. Yours is one of the States with less solar resources, certainly, than a lot of the country. What's your reaction to that?

Do you think, as a national matter, we should be trying to have a carve-out like you've got there in New Jersey, or not?

Mr. IZZO. Our preferred approach would be to have just the one national standard, and then to use the tax code to help those nascent industries that need additional help. That would include both solar and offshore wind.

The CHAIRMAN. So, you would not favor any kind of carve-out for—

Mr. IZZO. I would allow the States to have their own carve-outs in their programs, but not in the Federal program.

The CHAIRMAN. OK. Now, also, as I understood Dr. Lave's testimony, he was saying that we should not limit the amount of whatever standard is established, whether it's 15 percent or 20 percent, whatever—the amount that you could achieve through efficiency should not be limited. Do you agree with that, or disagree?

Mr. IZZO. I disagree with that position. We need every tool in our toolkit possible to achieve the 80-percent reduction, and we have separate programs on energy efficiency, which we're aggressively pursuing. Similarly, we need to pursue carbon capture and storage on fossil fuel generation in the R&D space. We need to pursue new nuclear. Those are all separate issues. All will be needed on top of renewables.

The CHAIRMAN. OK. So, you think having some national requirement for production of—or—electricity from renewables, separate from a national requirement for improved energy efficiency, it makes good sense.

Mr. IZZO. That's correct, Senator. Because, if you think about it, electricity is 35 percent of the CO₂ generated in this Nation. This bill proposes that we have 20 percent of it come from renewables. Twenty percent of 35 percent is 7 percent. We're nowhere near the 80-percent reduction. We will need to do all the things we've talked about.

The CHAIRMAN. OK.

Commissioner Wright, I was interested in your testimony. It seems as though you're arguing that, not only are States in the Southeast, such as South Carolina, unable to achieve the requirement that we're talking about here with regard to production from renewables, also it's very, very difficult, because of the economic circumstances you face, for you to achieve the energy efficiency reductions—or, improvements that we're talking about, that it's inappropriate for us to have a national requirement with regard to improved efficiency, as well. Is that your position?

Mr. WRIGHT. Yes, sir. You've got a lot of issues, but obviously we—in the Southeast region, we have low-income families and households, and they also live in housing that is inefficient, from an energy perspective, too. If they're not mobile homes, it's other types of housing.

Because, you know, we've got 10-percent unemployment in South Carolina right now; it's going to be 14 percent, they say, this time next year. So, it compounds itself. We believe that energy efficiency, under the RPS that you've got, that we're talking about today, the money leaves the State. We believe, if we do have an RPS, if it—that's where the Congress would like to go—and we're not opposed to a State-based RPS, but one that fits our area.

The money—if there were penalties paid, if there were compliance payments, that money should be reinvested back in the State, where it can be used to improve efficiency.

The CHAIRMAN. I remember a speech I heard Millard Fuller give, the founder of Habitat for Humanity, where he was saying that the people that they are building houses for can't afford large mortgages, and they also can't afford large utility bills. Therefore, they're building energy-efficient houses, Habitat for Humanity is. So, there's a little bit of a disconnect with saying, "Because the people are low-income in our State, we can't expect to see improvements in energy efficiency."

Mr. WRIGHT. You've also got—and I mentioned it in my longer version of the testimony, too—you've got a literacy problem, too, where they—it's just a hard thing for them to understand what they can do. You know, they're level-1 and level-2, a significant portion of these people, and it's just hard for us to—in the Southeast, to have the money leave our region and not be able to stay there, where it would—we could use it.

The CHAIRMAN. I'm reminded of our former President's concern about the tyranny of low expectations—

[Laughter.]

The CHAIRMAN [continuing]. Taking charge right here, as well. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Mr. Lave, in your comments, I think you suggested that the goal we are all seeking is the same, but then you went on to state that by focusing on a renewable energy standard, we're not necessarily getting to that goal of reduction in carbon.

There was an article submitted to the New York Times, at the end of January, written by the CEO of Entergy, and he suggested the same thing for his company, if we move to a renewable energy standard, they will stop doing research towards carbon sequestration, then how they can actually get to that clean coal technology? They will switch their focus to other areas and they won't be working to reduce their emissions.

Are we in agreement as to what it is that we are attempting to achieve with the renewable energy standard? Is it the reduction of emissions, or is it an increase in renewable energy production?

Mr. LAVE. Senator, that's a very good question. I think that at least my goals are to try and achieve—or, my—to try and achieve the goals at least cost. But, when you have an RPS, you reduce carbon dioxide emissions by much less than you would have thought, because you need to have backup for all of the solar and wind, and generally that backup is a natural-gas turbine, and generally that natural-gas turbine is having to function at much less than full power, and so, being relatively inefficient. So, for example, if we were to achieve this 20-percent renewable portfolio standard with wind and solar, you would have much less than a 20-percent reduction in carbon dioxide.

So, I think that at least my goals are to try and focus on these social goals of lowering greenhouse gas emissions, increasing environmental quality, increasing energy security, improving sustainability, and lowering costs. I think that not everybody has exactly those goals.

Senator MURKOWSKI. Let me ask a question about the regional disparity. You've supplied us with a couple of maps. I think we know that, across the Nation, wind is not equal, solar is not equal, biomass is not equal. I think that there is a disparity.

Mr. Furman, you've suggested that it's not discriminatory, and if in fact, you are going to apply, a one-size-fits-all standard, you will have areas that perhaps will not be on an even playing field. How can we best address the regional disparity?

Mr. Wright, you have suggested that the States need to develop their own renewable energy plans. There's been a discussion about whether or not you cap the efficiency aspect of it. Should we allow additional sources of clean energy to be counted? What is the best way to deal with the regional disparity?

I only have a minute left, so I'd like you to very quickly go down the line.

Mr. Izzo.

Mr. IZZO. The regional disparities are things we live with all the time. New Jersey has no coal, no natural gas, and no uranium 238, yet we produce nuclear energy, coal-fired power, and natural-gas-fired power. We're very grateful that other market sell that stuff to us.

Senator MURKOWSKI. All, but none of which is counted in your renewable energy standard.

Mr. IZZO. Correct. But, so, too, a national renewable portfolio standard will allow us to source renewable energy from those places where it's most efficient to source it from.

Senator MURKOWSKI. OK.

Mr. Furman.

Mr. FURMAN. The most important factor, to me, is a functioning renewable energy certificate trading market so that Commissioner Wright's consumers, for example, don't have to build a wind farm in South Carolina. It's not economic. But, what they can do is, they can buy the certificate from somebody who develops a wind farm in the Northwest or in the Upper Midwest, where it is economic, and they'll pay the same price that somebody in the Midwest would pay.

Senator MURKOWSKI. Commissioner.

Mr. FURMAN. To me, that is the best way to equalize the economic—

Senator MURKOWSKI. Commissioner.

Mr. WRIGHT. We buy our coal and we buy our uranium outside, it's—power's produced for our consumers inside the State. So, there is a benefit for our consumers in keeping costs low. If we have to send our money out, that's driving the cost of power up for our consumers, because we have to send that money as a compliance payment.

Senator MURKOWSKI. Mr. Jones.

Mr. JONES. In my comments on—addressing the regional disparities would be a broad, inclusive definition that recognizes woods' full capability to play a role in a renewable energy package, where 92 percent of the wood that's currently being grown in the south-eastern United States or across our country is being excluded from renewables. So, a broad, inclusive definition that would allow it to reach its full capability of being used as a renewable source.

Senator MURKOWSKI. Dr. Lave.

Mr. LAVE. There is something said here that's wrong. This notion that if we had tradable certificates, that the price would be the same in every region is just not correct. I have a Ph.D. student who's done a thesis looking at getting wind energy from the Powder River Basin to southern California. The transmission line itself would more than double the cost of getting the power there. So, if we had to build these thousands—tens of thousands of miles of long-distance transmission to get wind or solar energy to the major places where it's consumed, then I guess we could bear those costs as a Nation, but that's usually not the way we do things. I think the buyer has to pay those costs. So, the cost of power to places where you had to transmit it a long way would be a lot higher than the cost of power where it was generated.

Senator MURKOWSKI. Thank you.

The CHAIRMAN. Senator Dorgan.

Senator DORGAN. Thank you, Mr. Chairman.

It seems to me that the lack of some sort of central goal or aspiration for our country has been prevalent for a long, long while. The proposal of a renewable portfolio standard to just say, "Let's decide where America wants to head, here. Let's decide, for the next decade, where we want to go with respect to energy."

I'm listening to this, and it's kind of interesting. The fact is, Commissioner Wright, you all have about 50 percent of your power from nuclear, about 40 percent from coal—

Mr. WRIGHT. Sixty—

Senator DORGAN. All right.

Mr. WRIGHT. Sixty-one from coal, according to the PURC report that came out.

Senator DORGAN. All right, then it can't be 50 from nuclear—

Mr. WRIGHT. Right.

Senator DORGAN [continuing]. But, the fact is, you import coal and uranium to produce that power. So, we've built rail lines and barge lines, and so on, to be able to ship these things to where you need it. But, we had testimony in this committee from T. Boone Pickens and many others, about the goal of trying to build a national transmission grid, a sort of an interstate highway of transmission, to be able to produce renewable where you can produce it, and to move it where it's needed. I think that's necessary. We've certainly built rail lines and so on to accommodate the ability to move coal. We ought to do this with respect to transmission lines. If we're going to move toward an electric-drive-vehicle future, nearly 70 percent of the oil we use in the transportation fleet comes from outside of our country—if we're going to do all this, it seems to me you logically have to create some sort of renewable energy standard. A number of States have moved in that direction, but I think our country would be well advised to have a national standard. We've tried it a good many times. I hope this is the time when we will make that happen.

Having said that, I support coal development. The one point I would make, Dr. Lave, is, that—the implication of your suggestion is, that nothing else is happening. We've got \$4.6 billion for carbon-capture-and-storage research just in the economic recovery bill. The Energy and Commerce subcommittee, which I chair is putting a lot

of money into research. I'm convinced that we're going to be able to use coal in the future, and de-carbonized coal. So, it's not as if nothing else is happening.

But, I just wanted to make those points, because I think the testimony has been really interesting.

Mr. Furman, I think you made the point, as well, about being able to produce renewables from wherever you can maximize that production, and moving it on a grid. Was that the point you were making?

Mr. FURMAN. It is. Thank you, Senator, because I think there's two aspects to this regional issue that I think are being misunderstood. One is, we do need more transmission, in general, not just for renewables; we've got to do it anywhere. I testified a few months ago here about that issue.

But, in addition, if you are buying a certificate, if you are complying, not by buying power out of a wind farm, but let's assume that I—my company builds a 100-megawatt wind farm in North Dakota—which we are doing, actually—and we have a national REC market, renewable-energy-certificate market; we can sell those certificates into the market, and we can also sell the power into the grid. Now, somebody from South Carolina can buy that certificate, somebody from North Dakota can buy that certificate. It's the same price, and you turn it in for your compliance. It doesn't require, as Dr. Lave suggested, that we transmit the power to South Carolina; it simply requires that we sell the energy into the grid and then sell that certificate on the open market. It is a much more fair, egalitarian way of addressing the economics. There are regional disparities.

Senator DORGAN. Yes. There's an old saying, "If you don't care where you're going, you're never going to be lost." The point is, we need to have a direction, here, as a country.

I think one of the questions that has been raised by some of you is about the market system. I can't think of a more effective system in the world to allocate goods and services than the free market, frankly. But, there are times when it's very important to decide, "Here's where we want to go," set a direction, and then try to allow that market system to work inside that set of goals. I do not think a Renewable Portfolio Standard is in conflict at all with a market system. But, I think if we just decide, "You know what, we'll just let whatever happens happen," I don't think we'll ever get to 10, 15 or 20 percent renewable energy, because there are a lot of other ways for others to subvert that. I think it's in our country's interest to decide to produce more of our electricity from renewable sources.

So, you all have, I think, given us a lot to think about, and to my colleague Senator Murkowski, I think, too, there are probably things that can be contributed to this discussion and the creation of some sort of Renewable Portfolio Standard that can come from all areas of philosophy here on this committee. I look forward to the discussion that we can have to try to determine how we do a lot of things well—produce coal, in a manner that is protective of our environment, substantially increase renewable energy, and make us less dependent on foreign oil, which I think is a huge vulnerability for the future of this country. The question is, how do we do all of these things well.

The CHAIRMAN. Senator Corker.

Senator CORKER. I didn't realize it was my turn, down here. Thank you, Mr. Chairman.

I have to tell you that I think there are so many things right now that could unite our country around energy. I think there is a tremendous desire that this country be energy-secure. I think there's a tremendous desire that we do so in an environmentally sound way. It troubles me that the first thing we do, right out of the chutes, is discuss a policy that divides our country. It's an amazing thing to me.

I think there's a possibility that, as a country, we could come together around something that's transparent, relating to cap-and-trade or a carbon tax, that would do the exact market things that Senator Dorgan was talking about. Yet, today we seek a policy that divides our country, that discriminates. Now, if this is the first priority of this Administration—and I know that was said in earlier comments—I don't know if that's true or not, but if it is, it's an amazing thing to me that we would start out with such a crass policy that separates this country.

Mr. Furman, to say that it's not a transference of wealth for Mr. Wright to have to purchase certificates, which cost money, to meet an obligation so that it can be met in another part of a country—of our country, it's just not true. I mean, that's just absolutely not true. I don't think you would agree with this, but would it not be the same to say that, if you're going to benefit from any kind of national subsidies, like this would create, that we would make you build wind farms in every part of the country with your own money? That would be a national standard, and maybe that's one I could get behind, if you were doing it with your own money. But, explain to me how, in fact, if he has to buy certificates to meet a standard, and send money to you, that is not a transference of wealth.

Mr. FURMAN. I think we will probably—

Senator CORKER. Please be very brief.

Mr. FURMAN. Yes, I—

Senator CORKER. He would have to buy—pay money to buy those certificates, is that correct? They would go to another part of the country. Just "yes, yes," or "no, no."

Mr. FURMAN. Every—

Senator CORKER. I mean—

Mr. FURMAN. Yes, everyone will buy a certificate in the country.

Senator CORKER. OK.

Mr. FURMAN. Everybody will pay for it, and we'll be essentially the same price. There may be small regional differences. But, everybody will do that.

Senator CORKER. OK.

Mr. FURMAN. So, it would be—

Senator CORKER. So, it is a transference of wealth.

Mr. FURMAN. It's a transfer—well, in the sense that—sure, you will pay me to money to—

Senator CORKER. OK.

Mr. FURMAN [continuing]. Build my wind farm, and make an investment in—

Senator CORKER. What about if we made you build wind farms in Tennessee if you're receiving—you don't want to build 'them there, because there's no wind; you don't want to build solar, because there's no solar. But, what if we made you do that? Would you like that transference of wealth?

Mr. FURMAN. If—I don't—first of all, I'm not sure that's a transference of wealth, because we would only do it if we got a reasonable investment return.

Senator CORKER. Which—

Mr. FURMAN. Second, I think it would be inefficient—it would be a higher-cost solution to what we're talking about. The best wind resources are in the Northwest—or in the Upper Midwest, and that's where you should—

Senator CORKER. Let me—in the desert areas of our country, if we said they had to use hydro power there, how would you—how do you—is that a good idea?

Mr. FURMAN. That—it's a bad idea.

Senator CORKER. What about, in the desert, if we said you had to use biomass. Is that a good idea?

Mr. FURMAN. Of course not.

Senator CORKER. OK, then I just—I guess what I would say, Mr. Chairman, we have an opportunity, in a few months, I think, to debate something, like cap-and-trade, or to potentially have a carbon tax, both of which we could return 100 percent of the money back to taxpayers, and it would be very transparent, and it would create a market system. I have no idea why we would take this transference-of-wealth component out that—we have many environmentalists in our State. I happen to be one of them. OK? I happen to support some of these other initiatives. I cannot imagine why this administration would chose, on the front end, to divide our country—to divide our country instead of focusing on uniting our country around something that would create exactly the market-based system that Senator Dorgan is talking about, and not pit one part of our country against another.

Dr. Izzo, let me ask you this, would you be willing to build windmills and solar systems in Tennessee, with your own money, if we had sort of a national standard that said you had to do this in every part of our country?

Mr. IZZO. Yes, we would. We would charge you the cost of doing that, and your customers—

Senator CORKER. You wouldn't be able to sell it, of course, at that cost, but you'd be willing to do that—

Mr. IZZO. That's my point.

Senator CORKER [continuing]. With your own money?

Mr. IZZO. That's my point, is that we would do it wherever people wanted to, but there are places that it's lower cost to do it.

Senator CORKER. OK.

Mr. IZZO. So, you would have a choice, in Tennessee, of paying us 40 cents a kilowatt hour or paying 20 cents a kilowatt hour to somebody in Arizona.

Senator CORKER. Yes.

Mr. IZZO. The choice would be up to Tennessee.

Senator CORKER. That's a transference of wealth, isn't it?

Mr. IZZO. It's the same as when we buy coal from the Midwest or when we buy natural gas from the Gulf or when we buy corn from the Midwest.

Senator CORKER. No, because you're producing it in your own State, which is a whole—

Mr. IZZO. Not producing the coal or the natural gas.

Senator CORKER. You're producing the power from that in your own State. OK.

Mr. Chairman, I would hope that, with all the troubles that our country has right now, that, instead of creating this divisive picking of winners and losers, we would, instead, focus on something that will unite our country. I would just love if you would respond: Would a cap-and-trade system not actually affect carbon and global warming, that you care about so deeply, much better than having a renewable portfolio standard?

Mr. IZZO. A cap-and-trade system would be the underpinning of making intelligent market decisions. Senator, I never once, for a second, thought that a cap-and-trade system, given the regional variations in carbon intensity would be any less divisive than the conversation we're having now.

The CHAIRMAN. I hope we get a chance to test that proposition later—

[Laughter.]

The CHAIRMAN [continuing]. Later this year, and have an opportunity to do something on cap-and-trade in the Congress, as well.

Let's see, Senator Stabenow is next.

Senator STABENOW. Thank you.

First of all, Mr. Chairman, we are honored to be a member of this committee, as a new member who has tremendous interest, coming from my home State of Michigan, in energy. I want to thank you for your ongoing leadership on so many issues, and to our distinguished ranking member, as well. So, I'm looking forward to working with the committee.

I'm also looking forward to the provisions in the recovery package that really start us down the road as it relates to renewable energy incentives, and particularly around manufacturing, as well.

I just want to indicate, for the record, that there are 8,000 different parts in a wind turbine, and we can make every single one of those in Michigan, just for the record.

We also create about 30 percent of the polysilicon that's used as a basic material for solar panels, in Saginaw Township, Michigan, through Dow-Corning. I'd like very much to stop shipping that out of the country to make solar panels. I'd like very much to see it made in Michigan and around the country. So, that's my plug for Michigan. It's a plug, actually, for jobs, which I believe is very much about what this is about as we look at it.

I wanted to ask a question related particularly to forestry. We have 19 million acres, in Michigan, of beautiful forests, and one of the issues that I've been focused on is the fact that, while the tons of carbon per acre in a forest can vary greatly, we know that EPA says that many of our forests have about 100 tons per acre, we may be looking at 100 million tons of carbon in Michigan alone, so that my concern is, if we are not focusing on how we maintain those forests, we are actually making global warming worse by releasing

tons of carbon into the atmosphere. So, I'm anxious to see us have forestry policies a part of whatever we do.

Mr. Jones, I wonder if you might just speak a little bit more as to the definition—if we were going to craft a definition that best used wood and forest biomass and gave your private landowners a market so they were not selling their land for a shopping mall or a residential community or whatever—if we kept those forests—first, we're keeping carbon capture—we're stopping carbon from going into the air, but we're also then giving you a market. So, I wonder if you might just speak a little bit more about that.

Mr. JONES. I think the two things can work together. With the decrease of markets, without a new market for forest products that—a good definition—a broad, inclusive definition that would say “trees,” include all wood products that are being grown on private lands and these other lands. Without that, I think we run the risk of—higher risk of conversion to other uses, other than forestland.

When we convert the forestland to another use—a shopping mall, a residential community—we've lost it. Now we have no potential for sequestering carbon or capturing that carbon out of the air.

So, what I'm looking at is saying that, with increased markets, we'll encourage, not only the retention of forestland, but hopefully the growth of new forestlands, taking marginal agricultural lands and putting them into healthy, productive forests that, not only helping us meet renewable energy goals, but are also out there sequestering carbon and meeting other goals that society would benefit from—clean water, clean air, wildlife habitat, and all these other things.

So, if I look at a definition that would be in a renewable electricity standard, or an RPS, that would be encouraging, not only to the retention and growth of new forests for the CO₂ carbon benefits and also for those other benefits, I would say one that's very broad and says “trees.”

Currently, we have some very stringent laws and regulations, at the Federal and the regional and the State level, that monitor the health and sustainability of our forests. The Clean Water Act is a key piece of legislation that helps to make sure that we do our forest management practices correctly. Almost every State in the country has best management practices. Some in the Pacific Northwest are mandatory, in the Southeast—they're done on a voluntary basis, but they are all monitored. Every State in the country has a State forester, and they're monitoring and reporting on the health of our forests.

I'd say, without an inclusion of wood or forests into a renewable energy standard with that broad definition, we do run the risk of having higher conversion rates of forests into other uses, and then we lose all those other benefits.

Senator STABENOW. OK, thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much.

Senator Bennett.

Senator BENNETT. Thank you very much, Mr. Chairman.

Thank you, to the panel. It's been a very interesting discussion. But, it has struck me that the discussion has taken place in a stovepipe.

Let's look at our overall energy situation and energy needs. The one thing that is clear to me, as I try to look at that in the future, is that we have—I think, Dr. Izzo, you have hinted at it—enormous demand for huge scale of electricity, much more than we have now.

Let's, for just a moment, look at the overall energy needs. I've driven a hybrid car for 8 years. I didn't buy it for environmental purposes, I bought it because I wanted to become familiar with the technology, to see how it would work. Senator McConnell used to call my first one “the car you put on like a pair of pants”; it was a Honda Insight. As tall as I am, people had a hard time understanding how I got in it. Actually, it was really quite roomy once you got down that low and in that car.

[Laughter.]

Senator BENNETT. I now drive a Ford Escape hybrid. I increased my mileage substantially. If it were a plug-in hybrid—and I have driven one of those—we could have mileage of over 100 miles to the gallon. All right. Plug it in at night.

If we had, say, 30 million—that's 2 years' production of new cars—plug-in hybrids on the road, that would be 30 million batteries that could be charged with electricity at night, when the utilities are basically giving electricity away, and by—we wouldn't need to create any batteries. We would have a massive forest, if you will, of batteries that could soak up all of that electricity. That would require increased electricity.

So, when you look at the scale—and then, the economy continues to grow; you're going to want more electricity. So, if you can transfer the energy required for transportation into electricity, and meet the demand for electricity, you're talking a tremendous demand.

You're not going to meet that demand with wind and solar. I'm sorry. No matter how many windmills you build, no matter how many solar panels you put out, you're only going to be in single digits in the percentage of power you can provide in that kind of scale.

So, the thing that strikes me about this conversation is that, with the exception of Dr. Izzo and Commissioner Wright, no one has used the word for the greatest source of noncarbon renewable power that we have in this country, and that's nuclear.

Charles de Gaulle looked at France and said, “You know, we don't have very much natural gas, we don't have very much coal. We're going to have import all our power. We're going to become nuclear.” Eighty percent of the electric power in France comes from nuclear power, and they sell it over the border into Germany, where the greens have called a ban on nuclear power. You know, they take the nuclear power, they just don't want to have any of it in their own backyard. The French have never had any problems with storage, they've never had any problems with the fuel rods or any of the rest of it.

I'd like you to forget wind and forget solar and forget biomass for just a minute in this conversation, and talk about the scale that could be achieved in noncarbon-emitting renewable that we could get from nuclear. I'd like your opinions and reactions to that.

Mr. LAVE. Want me to start?

Senator BENNETT. Yes, Dr. Lave.

Mr. LAVE. It was only the “5 minutes” that kept me from praising nuclear, here. But, again, trying to be smart about this, the current nuclear plants we have in the country are running with operating factors of more than 90 percent. They’re doing very well.

We are on pace to build between four and seven new nuclear plants by 2020. We’re going to have to see how expensive they turn out to be. Right? There’s nothing wrong with the technology. We just have to see how expensive they are.

Senator BENNETT. Would you support building a reprocessing, like they have in France, so that the present spent fuel rods are also turned into a major source of power?

Mr. LAVE. I’m looking at Chairman Bingaman on this. This National Academy of Sciences study is looking exactly at that, and I don’t want to comment on that. But in—

Mr. IZZO [continuing]. About 4 or 6 weeks, you will have, I think, a definitive report on how much sense that makes.

But, here the one thing I’m trying to emphasize is that we would like to satisfy having low-carbon electricity, and so on, at the lowest cost; that is, we’d like to get these goals so we’re not wasting any money in doing it. Nuclear certainly has a role in that. How much these plants are going to wind up costing is then going to determine how much of a role nuclear will have in the future.

Thank you.

Senator BENNETT. Thank you.

Anyone else? Yes.

Mr. WRIGHT. Thank you very much for the question. We actually have three open dockets—or, two open dockets for three plants, nuclear—new reactors in South Carolina, as we speak, one, which will be voted on tomorrow, for two reactors, possibly. I believe, as you do, that, really, personally, we—maybe we should be looking at a clean energy policy that uses everything that we’ve got on the table in the United States, regardless of region, to try to meet energy independence, reduce our carbon footprint, look at greenhouse gas. I mean, we’re going to need it all.

You are correct, that the—about the hybrids and the plug-ins and all that. I mean, those—nuclear would be the way that answers that. I believe that it has a place and it will be developed.

Mr. FURMAN. Senator, I mean, I—just to—since you’ve asked the question, I don’t—I don’t—this is a personal opinion, but I think it was—it would probably also be reflective of my company. Nuclear, and, for that matter, clean coal, are legitimate tools in the toolbox, as Dr. Izzo pointed out. We’re going to need all the tools, going forward.

I think the only issue is timing. You know, you’ve had a number of nuclear projects that have been announced and then withdrawn, and partly that’s because, as Dr. Lave pointed out, we don’t know a lot about the costs of building a nuclear plant, because we haven’t built one in so many years. I think what has happened is, you’ve seen a number of companies start to build them and then realize that the costs have gone up far more than they realized. It’s a big bet, it’s putting a lot of investment in a single source.

Having said all of that—and similar for clean coal. Clean coal, I think, is definitely in our future. We have tremendous coal reserves; we just need to use them in a more environmentally responsible way. But, I don't think either technology is quite ready for prime time. That's a personal opinion. But, I don't think we should ever take away, from Dr. Izzo and the other utilities, the tools that we're going to need to reduce our carbon and reduce our reliance on foreign sources, as well.

Mr. IZZO. I think the points have already been made. It clearly has to be part of the toolkit, and we don't know what the capital costs are. We know that nuclear plants run 90 percent of the time, solar panels in New Jersey run 10 percent of the time; a factor-of-10 difference. There's no way I can build a new nuclear plant in 4 years. We're putting solar panels up today. We'll have offshore wind running in 2 years.

The science keeps telling us that timing matters. The more carbon we put in the atmosphere, the more inertia we build into the system, the tougher it'll be to undo it.

Senator BENNETT. But, you're still operating in single digits with wind and solar, you're not addressing the scale problem.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Bayh.

Senator BAYH. Thank you, Mr. Chairman.

My first year at law school, the dean, on our first day, advised us to embrace "exuberant skepticism." So, I'm going to try and follow in that tradition today. But, don't read too much into the questions I'm about to ask; I'm just trying to get to the practical bottom line here.

Dr. Lave, do I have the pronunciation of your name correct? Let me start with something—and it gets to what Senator Bennett was asking, there at the end. If I understood your testimony correctly—I think one of the other panelists indicated that about 37 percent of our CO₂ emissions come from the generation of electricity. So, even if we embrace—and I think this is the point you were making—a 20-percent RPS standard, that gets us to about a 7-percent reduction in CO₂ emissions. Is that an accurate representation of your testimony?

Mr. LAVE. Actually, less than that, because you'd—

Senator BAYH. I was going to follow up and ask and—then you—

Mr. LAVE. Yes. Sure.

Senator BAYH [continuing]. Referred to backup capacity. So, my question to you is, on CO₂ emissions, If we adopt a 20-percent standard, what is your estimate in terms of what we would actually achieve, in terms of net CO₂ reduction?

Mr. LAVE. I think that if the 20 percent came from wind and solar, that the reduction in CO₂ emissions would—might be on the order of about—instead of 20 percent, about 12 percent of the electricity total. Right? So, that is—you're getting a little bit more than half of what it is you might assume.

Senator BAYH. My math is not very good. You said—12 percent of 37 percent gets to what, about 5 percent?

Mr. LAVE. Something on that, sir. Yes, sir.

Senator BAYH. OK. But then, it's not all going to be wind and solar, correct? You are going to have some biomass, you are going to have some other things. If you assume that, given the geographic complexity, and given the diversity of the country, you're looking at something south of 5 percent?

Mr. LAVE. I think that when—when you're looking at biomass or geothermal, then—or this new hydro—that's really a kind of a one-for-one—

Senator BAYH. OK.

Mr. LAVE [continuing]. That is, that's reliable. You don't need backup on those, so you really get a one-for-one reduction in CO₂ emissions.

Senator BAYH. OK. So, we're looking at about 5-percent, then?

Mr. LAVE. Perhaps, yes.

Senator BAYH. If you net it all out.

Mr. LAVE. Yes.

Senator BAYH. OK. Do any of you—there's really not much of an argument to be made that a Renewable Portfolio Standard decreases the need to import foreign oil. Is that correct?

Mr. LAVE. Sir, only 2 percent of electricity is generated by oil.

Senator BAYH. Right.

Mr. LAVE. That's generally PEDCO. So, I don't think we're talking about that. The point was made earlier about natural gas imports. If we started importing a lot of natural gas, that would be an energy security issue. I think that's likely to happen in about 5 or 6 years. But, there's dispute on that.

Senator BAYH. So, if we wanted to really seriously tackle CO₂, we've got to look at things with more scale and scope. I think that's the point that Senator Bennett was making, and it seems to me that that's the point you are making.

Mr. LAVE. Yes, sir.

Senator BAYH. Let me play the devil's advocate, here, as a former Governor, but someone who now has a national perspective and understands that sometimes that has to take precedence. Our State has considered an RPS standard in our State legislature, and has chosen not to adopt it. For those of you who support this proposal, why do you think you know more about what is in the best interests of the people of Indiana than our State legislature or our Governor?

Mr. IZZO. The primary purpose of the standard is really to forge a nexus between three critical issues that are affecting, not only the nation, but the planet. The first issue is global climate change. It's not "New Jersey climate change." The second issue is energy security. It's national energy security, it's not "New Jersey energy security." I'm picking on my own State.

Senator BAYH. Right, but—

Mr. IZZO [continuing]. Third issue is creating jobs.

Senator BAYH. How does this relate to energy security?

Mr. IZZO. If you electrify transportation, as I think the Nation should seek to do, you're going to just shift the carbon production from transportation to electricity.

Senator BAYH. Correct, but there are other ways to generate electricity than just a Renewable Portfolio Standard.

Mr. IZZO. Not carbon-free. Nuclear and renewables are the only way to do that right now. We don't have carbon capture and storage. If I put a shovel in the—if I decide, today, to invest the money needed to build a nuclear plant, it won't go COD for 12 years.

Senator BAYH. Do any of you have an estimate—our State is about—I think we get less than 1 percent of our energy from renewables, currently; we're about 95 percent dependent on coal generation for our electricity. Any of you care to estimate what this would do to the cost of electricity for the ratepayers in Indiana? Maybe, Mr. Wright, since that's your business, do you have any idea about that? Or any of the others, on the other side of the debate? I'd love to hear from you, too.

Mr. WRIGHT. That is a real concern for my State, but I can tell you—

Senator BAYH. This is essentially a tax increase.

Mr. WRIGHT. It is. It's been estimated that it's about—around \$270-million impact to South Carolina. I have some numbers from Arkansas, from their co-ops and from, I believe, Entergy, who does theirs, and they were talking as much as—by 2015, \$1.7 billion, at a rate of about \$340 million a year—

Senator BAYH. My time—

Mr. WRIGHT [continuing]. For—

Senator BAYH [continuing]. Is expired, but I think your point was that if you're going to have to pay for some of these things, you'd at least like to have it returned to the State to focus on energy efficiency—

Mr. WRIGHT. Right.

Senator BAYH [continuing]. To deal with the problem you've got.

Mr. WRIGHT. The ratepayer has to pay it. That's my concern, as a regulator. I've got to watch out for the ratepayer.

Senator BAYH. Mr. Chairman, my time is expired, but anybody on the other side of this debate want to address the issue of rate increases and that kind of thing?

Mr. FURMAN. Senator, I thank you for the opportunity to address this—I think one thing that has—that is often not taken into account in some of the studies that were just cited—they're simply looking at the cost of renewables, they're not looking at the impact that renewables will have on the gas market—renewable energy, whenever we—and I used to operate a utility system, and, you know, during the energy crisis in California, you know, we were facing extraordinarily high prices. Bringing on wind, we could do it in 18 months, we could do it very quickly, and it very—and it absolutely displaces natural-gas generation. A lot of the market for electricity generation—not everywhere, but a lot of the places in the United States—is based on the price of natural gas. So, when you drive down what—there's an economic benefit to displacing that generation.

I think the other thing that I would say is, energy is national. I mean, when we operate the utility grid, you know, we have to pay attention to people like Commissioner Wright, because they drive our economics. But, the fact of the matter is, electrons go where they want, and the rest of the energy network, you know, is a free market. I mean, coal moves freely around the country, as does natural gas and other commodities.

So, this is a national issue. This is an issue of national imperative, because 5 or 6 years will be here before we know it, and we need to get prepared, not unlike what France did with nuclear power, not unlike what Brazil has done with ethanol; they've adopted national policies, because they've made sense for the times. I think that's where we are.

Senator BAYH. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Barrasso.

Senator BARRASSO. Thank you very much, Mr. Chairman.

I believe Senator Bayh is absolutely right, because nearly 96 percent of our electricity comes from coal in Wyoming. Wyoming consumers have some of the lowest retail prices per kilowatt hour in the United States. We're at 5.2 cents a kilowatt hour for electricity in Wyoming, and it's not a coincidence that those low costs are related to coal. Coal is still the most affordable, available, reliable, and secure source of energy in the United States. I think that mandating a national renewable portfolio standard like this will have, you know, an immediate impact, and direct impact, on the people in Worland, Wyoming, and all across the communities, higher electricity costs. It doesn't seem like we heard anyone say, here, that it will not have a higher electricity cost.

But, I want to get back to something Senator Bayh talked about, which was the practical bottom line. The Wall Street Journal had an article yesterday, "New Grid for Renewable Energy Could be Costly." I don't know if you saw that, on page A4. It talked about the 15,000 new miles of transmission line that'll be needed, about 100 million—\$100 billion in cost. But, one of the things that they talked about is, the power lines will have to be built somewhere, in someone's backyard; and they thought 15,000 new miles of transmission would result in about 15,000 lawsuits. The question is, How do we, you know, address this whole issue when we take a look at legislative proposals on a renewable portfolio standard? Is it appropriate, at the exact same time, to address the regulatory, the legal issues, that create the bureaucratic hurdles, whether it's NEPA, whether it's the Endangered Species reform? Those are things that come to mind. I'd like to go down the panel to see, How do we address that as we look to try to put this national energy grid together?

Mr. Izzo.

Mr. IZZO. Perhaps incorrectly so, I compartmentalize this discussion into two components. Component No. 1 is, Do we need renewable sources of energy? The answer to that is, emphatically, yes. Then the question becomes, Where do we develop them? That answer is much more complicated. That is a tradeoff between where are the resources and where are the users. Transmission is a cost that has to be applied to that. So, the factors of production may favor the Southwest for solar, but shipping that to the Northeast will add cost to it. One, therefore, has to debate, well, even though there's less sun, perhaps, someplace else that's closer, the delivery charge is less. So, the whole notion of delivery charges will influence where, but not how much.

Senator BARRASSO. So, you're talking about financial cost, but there's also a time cost involved in trying to go through all of these processes, which, even if the money is there to start with, day one,

you're still taking a look—and Boone Pickens, when he came here, he said his biggest challenge was not the money, it was the time delay in trying to get some of these things going.

Mr. IZZO. Absolutely correct, Senator.

Senator BARRASSO. Mr. Furman.

Mr. FURMAN. If I could add a couple of things. One, the cost of transmission, in the grand scheme of things, is about 10 to 15 percent of the cost of delivered electricity. So, while we can talk about big numbers for transmission, that only looks at what it costs—there are—whenever you build a transmission line, there's a corresponding benefit. You have lower costs of dispatch, you have other benefits. So, transmission, in my view, is a good deal.

Second, we have massively under built and maintained our transmission system in this country for the past 10 to 15 years, maybe 20—maybe approaching 20 years. We have to build a lot of transmission. Even if you completely reject a renewable portfolio standard, we have to make substantial investments.

The third point I would make is the impediments to building transmission are several. You mentioned siting and environmentally—just the whole siting issue. That is a big—"not in my backyard" is a big issue. But, second is joint planning, the ability to look across States and to plan. Then, the third and most important is cost recovery. We're asking commissioners, like Commissioner Wright, to make decisions every day about building the national grid. It is an interstate highway system, and it's as if you were asking a commissioner in Pennsylvania to authorize the construction of an interstate highway going from, you know, New York to Detroit; it—

Senator BARRASSO. Thank you.

Mr. FURMAN [continuing]. Doesn't work.

Senator BARRASSO. Commissioner Wright.

Mr. WRIGHT. You raised some very good issues. You know, I— one of the things that I've thought about, just—when they talked about, "Well, South Carolina has possible wind off the coast." I mean, are we going to go off any lands, like Federal lands or anything like that? That would be a real issue. How does—how is that going to be addressed? I agree, I think your 15,000 lawsuits are low. I think there would be more than that.

But, you know, again, I'm back to the State. I'm responsible for making sure that we have reliable, affordable power and that our utilities are able to do that at a profit that's regulated. So, I think—nationally, I think you do need to look at transmission; I think it's going to have to be something you've got to do.

Senator BARRASSO. Mr. Jones.

Mr. JONES. Once again, I think if we allow all available renewables to participate, we can help take advantage of some of the existing resources and facilities, and hopefully somewhat offset the impact of new transmission.

Senator BARRASSO. OK.

Mr. LAVE. The analogy with the interstate highway is not a correct analogy. The interstate highway meant that I could get on the freeway in one part of Pittsburgh and get off it at another part of Pittsburgh. When we build a transmission line, it's from here to there. Right? It is directed at a particular place. It's not something

that somebody else can get on and go. So, it's a piece of national infrastructure, but it's not like the interstate highway.

Again, we had a Ph.D. thesis that was done, trying to take a look at whether—the difficulty with siting transmission. The answer is, there are—it is really difficult to site transmission. Under the legislation passed 2 and 4 years ago, Pennsylvania—most of Pennsylvania was designated as a national transmission corridor. You want to count the amount of transmission built in Pennsylvania, or approved? Right? That is that we've got a congressional delegation that's going to tell you, "You're not going to build any damn transmission in Pennsylvania, thank you very much." I think that's going to be true.

Then, just one other part of this, and that is, it is true that if we had a national market in these renewable standards, that the price would be pretty much equal across the Nation, but the price of electricity would not. In your home State, electricity would be really cheap. In southern California, it would be really expensive. I don't want to get into too much jargon, but there are things called "locational marginal prices" that depend on transmission costs, that depend on congestion. Those LMPs are really different between different areas.

So, I think the result of this would be that, yes, South Carolina would have to pay 3 cents a kilowatt hour for that, but it would be on top of a much higher price of electricity than you were paying in Wyoming.

Senator BARRASSO. Thank you.

Mr. Chairman, Dr. Lave had a wonderful article on the issues in Science and Technology, fall 2008, called "A National Renewable Portfolio Standard: Not Practical."* I would commend it to the committee and ask that a copy of it be made a part of the record.

The CHAIRMAN. We will include it in the record.

Senator BARRASSO. Thank you, Mr. Chairman.

The CHAIRMAN. I think Senator Menendez was here at the beginning of the hearing, and he's come back, so perhaps we should let him ask questions.

Senator MENENDEZ. Thank you, Mr. Chairman.

Dr. Izzo, I know that the RPS that New Jersey has created has created hundreds of new jobs. But, if we institute a strong national renewable electricity standard, doesn't it have the potential to create thousands, or even tens of thousands, of new jobs in manufacturing, in installing wind turbines, solar panels, jobs boring holes for geothermal projects, jobs harvesting biomass, engineering, designing, all of these projects? So, when we balance, in terms of the costs, isn't this really a very strong job creator?

Mr. IZZO. There's no doubt, Senator. You've hit upon all of the categories, as well. Obviously, we're most affected by the installation jobs, but there are manufacturing jobs. I know there have been some large announcements made by Vestas, in Colorado. The Senator mentioned some jobs that were coming to Michigan for blade manufacturing, and then the ensuing multiplier effects. But, you said it well.

* Article has been retained in committee files.

Senator MENENDEZ. Let me ask you, 28 States currently have an RPS policy in place, and many are much more aggressive than any of those being proposed federally. Do you agree that, if we were to pass any Federal standards, that States should retain the ability to have their own stronger targets?

Mr. IZZO. Yes, without question. To that point, Senator Menendez, I will say that, in 2007, 76 percent of the renewable energy generation that was built in this country were in RPS States. So, RPS matters in encouraging renewable generation.

Senator MENENDEZ. Finally, Mr. Chairman, I wanted to get Dr. Izzo to agree with me twice so I could disagree with him once.

[Laughter.]

Senator MENENDEZ. That is, I'd like to ask unanimous consent to introduce into the record a study from the Lawrence Berkeley National Laboratory. It's entitled "The Treatment of Solar Electricity in Renewable Portfolio Standards."* The study shows that States that had a specific carve-out for solar energy successfully created the construction of solar projects, while those without a carve-out did not lead to solar deployment. It seems to me, if we do not have a carve-out in this bill for other technologies, or a reverse carve-out limiting how much of a requirement can come from onshore wind, we will find ourselves, in 2020, with only one mature renewable technology. It seems to me that we need a system that helps various—several mature technologies to be achieved in order to reach our collective goal.

So, I'd ask unanimous consent to include that in the record. I think it's an important part, certainly, of the debate, as we move forward in figuring out how we have multiple renewable energy sources that can mature to both productivity and commercial deployment in a way that meets these goals.

The CHAIRMAN. We will include that in the record.

Senator MENENDEZ. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Burr.

Senator BURR. Thank you, Mr. Chairman.

As you can see, there's tremendous interest in this subject and the need for extended hearings, I think, especially to have the administration here to tell us how they would implement a Federal RPS. So, I know, and I hope, that the chairman will have additional meetings.

I'm sorry Senator Bayh left, because I did have the Duke Energy projections of what the RPS would cost for Indiana. I'm not sure if Duke's the sole supplier of power there. It's \$715 million over 10 years. Of course, under this proposal, the costs would extend to 2039. For North Carolina, the 50 percent that Duke covers would be \$1.5 billion. For South Carolina, Commissioner Wright, \$591 million just for the Duke portion. I might add that those numbers, for North Carolina, do not include the cost—does not take into account the "renewable mandate in North Carolina" cost. So, it's far going to exceed that, before we've actually paid for the power.

Let me turn to you, Commissioner Wright, if I could. We've already discussed that North Carolina is the only southeastern State with a renewable portfolio standard, 12 and a half percent. How

*Document has been retained in committee files.

would this Federal program, in your estimation, affect North Carolina and its ratepayers?

Mr. WRIGHT. Those things that are qualified under North Carolina's RPS may not be the same as what is in the standard that we're talking about here today. I haven't looked at the detail, specifically, of the RPS in North Carolina to know what's covered and what's not. In North Carolina, the 12-and-a-half percent—I believe 40 percent of that 12-and-a-half can come from energy efficiency, which, I think, you do the math, it's—that's 5 percent. So, that's the same as what's in the RPS we're talking, today. But, you know, every State is going to be different. Those that have RPSs, they're not the same as what we're talking about in this particular proposal today. So, it will affect States. It's going to be costly to them—

Senator BURR. Yes.

Mr. WRIGHT [continuing]. Especially in my region.

Senator BURR. Mr. Furman, if I understood what you provide in the wind generation, you're proposing that you should get a renewable—there should be a renewable electricity credit that's traded. If South Carolina needed additional renewables to meet their portfolio standard, they would pay you for that credit. In addition to that, the power you generated, you are selling, so you're getting money because you're providing him a credit, and you're producing power that you're selling. Do I understand it correctly?

Mr. FURMAN. That's true.

Senator BURR. I encourage you to get with General Motors, because they cannot figure out how to make money.

[Laughter.]

Senator BURR. If they could figure out how to provide a picture to people that would like to buy a Suburban, but, because of fuel efficiency standards, are buying a hybrid, then—and they could make money by selling the picture and money by selling the hybrid, I'm sure that they could figure out how to make money and compete against the Japanese. But, I'm not sure that—unless we give you the honeypot of people paying something for nothing, except to meet this arbitrary number that we've set—not one that's set by our State, one that we have applied a one-size-fits-all across the country and said, "Doesn't matter whether, geographically, you can take advantage of anything, we'll give you the ability to buy this credit so everybody hits it, but we're not going to pay any attention to how much that costs you or how much money you export." It's a great business model. I commend you for it. I'm just not sure that I want to be a participant in something that accomplishes a good feeling, but not an effective cost for the ratepayers in the States that don't have the benefit.

Now, we've looked at the trading that goes on with carbon trading in Europe. I'm sure it has its supporters and its detractors. I want to look at how they've cleaned up their emissions. It hasn't cleaned up very much. There's a lot of money trading hands. At some point, we've got to get focused on the outcome, and that's, Are we improving the emission standards in this country?

Now, let me just turn to you, Dr. Lave, for 1 second. Your full testimony had much more about nuclear. I'm in agreement with

you on that. One specific question. Should nuclear be considered a renewable for the purposes of us considering this legislation?

Mr. LAVE. Senator, I would never answer a question like that.

[Laughter.]

Mr. LAVE. I think that we have enough uranium so that we can generate a tremendous amount of nuclear power for now and the future. Whether it is strictly renewable, in the sense of going on forever, I think that's not true. But, if you were looking at a century, or more than a century, there's certainly enough uranium so that we could generate nuclear power—

Senator BURR. If we adopted reprocessing in this country, we could—instead of storing 97 percent, using 3 percent, we could use 97 percent and store 3 percent, which is, hopefully, the conclusion that the study will come to.

I think you raised a very good point; we haven't built a nuclear plant in some time, we don't know what the cost is.

I would sort of go back to where Senator Dorgan was. The fact that we haven't proceeded forward is because we haven't had a comprehensive blueprint of energy policy for the future. I wish we could focus on that comprehensive energy blueprint first, and figure out what that is and how all these pieces fit, before we start creating the pieces. We may find out they don't fit in the comprehensive energy policy that's in the best interests of the country, both from a standpoint of security and from a standpoint of cost-effectiveness.

I thank the chairman.

The CHAIRMAN. Thank you.

Next is Senator Landrieu, and then we have Senator Cantwell and Senator Shaheen and Senator Lincoln. We're supposed to have a vote at 12 o'clock. So, we'll just keep going.

Senator LANDRIEU. Thank you, Mr. Chairman.

I'd like to begin by associating myself with remarks of the Senator from Tennessee, in a broad way, that I do hope that, as we begin this debate, we can begin with a more unifying call than something that could potentially, you know, divide our country. I want to say how strongly I agree with him that, in my 12 years in the Senate, I have not seen the country more ready to embark in a new direction, but it has to be a direction that makes sense to them, with clear and defined goals.

I'd like to start, Mr. Chairman, with a visual that might help us understand the challenges of what we're talking about when we talk about wind. The latest generation of windmills, using the most modern technology and construction material, are almost 100 meters in diameter, they stretch higher than a 40-story building, which is about half the size of the Eiffel Tower. A windmill produces 1 megawatt of power when the wind is blowing at a relatively high speed of 10 meters per second. It would require 1500 of these windmills to produce the equivalent power of one nuclear power plant, and it would take 90,000 acres, one wind farm, which is 144 square miles. By way of comparison, Washington, DC., is only 68 square miles.

So, I just want to repeat that. Wind is very attractive. I'm attracted to it. Most Americans are. Solar is very attractive. But,

there are some significant and real challenges with wind. Land and space is just one of them.

The other challenge is a poster that I want to—and aesthetics, may I say—the other challenge is represented by this poster. In the Southeast, where I'm from, Louisiana, we don't have much wind at all. Now, we're blessed with a lot of oil and gas, and we have nuclear power, significantly, here, and hopefully more. But, we virtually have no wind. We might have some, offshore. That is exciting. We may have some tidal energy, as well, which is in its infancy stages of development. But, we virtually have no wind compared to the other parts of the country.

I also want to hold up a visual about solar. While we think we have a lot of sun, and it tends to be hot in Louisiana, we don't have the same resources of sun and geothermal in the Southeast.

Which brings me to the goal of what I think we should be achieving or looking at, is where most Americans are; they're excited about the possibility of being clean—not just renewable, but clean—and secure. If there was any feeling of the last election, it was that America has an opportunity to be secure. If we address this in a broad way, sensitive to regions, I think we might be able to achieve some significant advancement. I'm not sure that this particular bill is the way to get there.

Let me ask a question, to anyone who would care to answer it. This is a Louisiana ratepayer's question. Under the proposal that we have before us, that, in my view, puts too much of an emphasis on wind and solar, not enough emphasis on regional choices and menus that make sense, our ratepayers—let me try to understand—would have to purchase large amounts of renewable energy credits, primarily from solar and wind; but, once they do that, is it not true that they still need to generate power? We'll still buy our power from traditional sources—coal, gas, and nuclear? So, aren't we asking, Mr. Furman and Dr. Izzo, that our ratepayers, like other States, would have to pay twice? We'd have to be buying the power for renewables, and then also paying the regular rates to maintain the current infrastructure that we have now, because it's not going to go away.

Mr. FURMAN. Senator, no, I don't believe that's true. Let me hold up a—it's small, but let me hold up—one thing that is being missed in this entire debate is the massive biomass resource that exists in the Southeast and the Upper Midwest. This picture is from the National Renewable Energy Laboratory, and it shows the biomass potential that could be delivered. So, anybody in Louisiana, any utility ratepayer in Louisiana, would have the option of either buying a credit from anywhere—the Upper Midwest—or developing, within the service territory, a biomass facility.

Now, some—a lot has been made about how expensive this was. Senator Burr made reference to General Motors. The fact of the matter is, this is all going to be market-driven. We will—the benefit of this approach to a renewable energy policy is that the market will be free to deliver the least expensive option. So, yes, we will still need to be buying and consuming electricity, just from the grid, but this provides a way for the Nation, as a whole, to move its consumption of electricity toward renewables, reducing demand—

Senator LANDRIEU. But, Mr. Furman, do you agree with Mr. Jones that, under the current law that we are reviewing right now, the current draft, that the biomass definition—or do you say, Mr. Jones, the wood products—is not as clear as it could be. I don't disagree that we have a lot of forests in the Southeast, we also have the opportunity for biofuels. But, it's the approach that we take. We are very excited about the nuclear—expansion of nuclear. So, I think that we have to take that into consideration.

But, I want to get this on the record. Do you agree that it would take 1500 of these giant windmills to produce the same power as one nuclear power plant? Do you agree that it would take 90,000 acres, or 144 square miles?

Mr. FURMAN. I do not.

Senator LANDRIEU. OK.

Mr. FURMAN [continuing]. If I could clarify why. I think the numbers that you gave, Senator, were a 100-meter tower and a 1-megawatt wind turbine. In fact, a 100-meter tower is going to be a 2- or a 3-megawatt wind turbine. So, we're typically seeing 1,000 megawatts—if you want—

Senator LANDRIEU. So, instead of 144 square miles, it would be two-thirds of that?

Mr. FURMAN. It would be less. It would be—

Senator LANDRIEU. A half.

Mr. FURMAN [continuing]. Significantly less. I think the—the other thing that is interesting about how you look at wind—

Senator LANDRIEU. Which would be about the whole size of Washington, DC., not twice the size.

Mr. FURMAN. Yes.

Senator LANDRIEU. It would be the whole size of Washington, DC.

Let me just end with this, Mr. Chairman. As a Senator who's represented oil and gas, which is tough these days, I have to hear my colleagues say to me, "We don't want an oil and gas facility anywhere near us." Now, I think they look pretty nice, particularly at night. It looks like a Christmas tree to me out in the Gulf. But, you know, I can appreciate that they don't want to look at it. How are we going to get them to look at these windmills, acres and acres and acres, mile after mile after mile? I mean, I don't think they're ugly, but I don't say they're any prettier than oil and gas fabrication facilities.

So, until someone really gets a handle on what the landscape of this country is going to look like if we are so determined to upstart a wind industry, as opposed to trying to make America clean and energy-secure, I think that we have to adjust our direction here.

Thank you.

The CHAIRMAN. Senator Cantwell.

Senator CANTWELL. Thank you, Mr. Chairman.

Thank you, gentlemen, for your testimony. I've listened with interest to my colleagues making various statements. I guess I look at this issue a little differently, considering the excitement around distributed generation. Just like the change from mainframe computers to computers on a desk, the same efficiency now can come from distributed generation, as from centralized power plants and

that is bringing the source of energy closer to those that use it. It's more cost-effective.

In that, I also think that we are missing some of the issues about hidden costs. I mean, everybody always looks at the cost of CO₂, and we haven't quite put the price tag on that here, legislatively. But, there are other issues. I am thinking, Mr. Furman, of your testimony, particularly as it relates to natural gas. Farmers in Washington State almost went out of business over the price spike in natural gas in recent years. We cannot continue to have natural gas go up to \$14 on whatever it was, and think that we're going to survive.

The electricity grid, with 50 percent of its power generated from coal and a big chunk of it from natural gas, as you pointed out, would benefit from a renewable portfolio standard that would allow us to diversity our fuel mix. Would it actually reduce the cost of natural gas by 15 percent as the report says? Is that right, Mr. Furman?

Mr. FURMAN. Yes.

Senator CANTWELL. So, that's a big advantage. That's a big advantage to farmers all across America, if we can keep down the cost of fertilizer. These pressures are going to continue to grow. So, I think we have to include all the costs.

But, I do have another question. Mr. Jones, we tried very hard, here in the United States Senate, to have our language on "sustainable woody biomass" prevail in the 2007 bill. We weren't successful with the House in doing that, but we'll go back and we'll try again.

But, my question is, given the current state of PTC-ITC lack of credit flow, and given this discussion about RES, is it possible to look at ways to make those regional projects more cost-effective? We've been battering around loan-guarantee concepts between the House and the Senate. Should we be looking at meeting the RES standard with further incentives from the government, something like low-interest loans amortized, maybe over 30 years, with, perhaps Fed rate—near zero—that would help, actually realize the cost-effectiveness for the ratepayers of these projects in some of these regions?

Mr. FURMAN. Senator, if I could answer—there's no question that all of those programs help, and particularly—you know, our current problem is—the whole system of incentivization for renewables has sort of broken down with the collapse of Wall Street, and we're unable to monetize any of this. You know, most of that benefit, if not all of it, does flow back to consumers in the pricing that we provide to utilities.

Loan guarantees, I think, are, you know, definitely a help, not just in incentivizing, but also in helping us to get through this short-term problem that we have with the collapse of the markets.

But, I think that, in terms of regional differences, which is what you were, I think, alluding to—

Senator CANTWELL. For the Northwest, with 72 percent hydro and on the way for other renewables, yes, those are easier challenges to meet. But, maybe part of RES is the ability to get access to capital at a low rate to help drive down the cost of some of these implementations.

Mr. FURMAN. There's no question that would help.

Senator CANTWELL. Mr. Jones.

Mr. JONES. I would say, in the current writing of the definition, the issue we're hearing from power companies that are looking to my members to—as a resource in the Southeast who are about to build biomass facilities, the issue they have now is, Will land-owners survive long enough in order to provide that resource? The way the definition is written right now, it's hard to site an energy facility and say, "Where can we put this energy facility where we know we'll have a guaranteed supply of wood?" That's stopping the financing of these facilities, because the financing of these facilities are—they're saying, "Can you guarantee a supply of wood 3 years from now?" With the current market situation and where we're going, that's tough to say. The way the definition is written is a further constraint, because it's putting very narrow boundaries on the amount of available wood that can be there, when we have a lot of wood, but only a certain amount can be utilized.

So, I would say, by broadening the definition, we can definitely, hopefully, free up some incentives for these facilities to come in and make the banks a little more willing to make loans to their startup.

Senator CANTWELL. The language that we had about "sustainable woody biomass," that met the test?

Mr. JONES. I think when we talk about sustainability, we're looking more at the forest health, so I think we could be broader and just say that, you know, we just have "all woody biomass," that includes all plants and trees, and that would help meet the test.

Senator CANTWELL. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Mr. Lave, I'm informed that you need to leave to catch a flight. We appreciate you being here, and we certainly excuse you.

Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman. Thank you, to all of the panelists.

I certainly agree with several of you who have talked about the need to move this country in a new energy direction that uses more clean energy technologies and that that's not only an environmental imperative and a national security imperative, it's also an economic imperative. I think that a renewable portfolio standard could be essential to doing that.

Two years ago in New Hampshire, we enacted an aggressive renewable portfolio standard law that requires all utilities, as well as competitive suppliers, to produce 23.8 percent of their power from renewable sources by 2025. Now, one of the reasons that we require competitive suppliers to do it is because, when I was Governor, New Hampshire restructured its electric industry to make generation of power a competitive function. I'm sorry Dr. Lave is gone, because one of the reasons we got to that point was because we built the last licensed nuclear power plant in the country in Seabrook. That gave us the highest average electric rates in the country. So, trying to get to a more competitive power supply was important.

But, my question really is—and, Dr. Izzo, I would ask you if you would take a crack at this first—should a national renewable elec-

tricity standard apply to competitive suppliers, in addition to utilities? Then, should it also apply to all utilities? In New Hampshire, we have a number of municipal utilities; they don't generate 4 million megawatt hours a year. But, should an RES or an RPS apply to everybody?

Mr. IZZO. The answer to that is yes. The way we do that in New Jersey is, we make it the burden of what we call the load-serving entity, the company that owns the meter and the wire into the home. So, when they require it of the supplier, the regulator typically allows them to pass the higher costs from the supplier—because it is higher cost—to their customer. It works seamlessly. But, the short answer to your question is, yes, it should apply to everyone.

Senator SHAHEEN. Can you talk a little bit about what you think the consequences might be, if any, of not having it applied to everyone?

Mr. IZZO. Besides the inconsistency, I mean, a ton of carbon, whether it's emitted by a utility-owned generation plant or whether it's owned by a competitive power plant or whether it's owned by a municipal co-op or whether it's owned by an IOU, is still a ton of carbon. Once again, if we are going to give birth to some nascent industries here, whether that's onshore wind, offshore wind, biomass, solar, the economies of scale matter. So, why chip away at that? We're talking about 7 percent of the 80 percent. We have a lot of work to do here.

Senator SHAHEEN. Thank you.

The CHAIRMAN. Senator Lincoln.

Senator LINCOLN. Thank you, Mr. Chairman. Mr. Chairman, I'd note that the women have been hanging in here with you at the end.

[Laughter.]

The CHAIRMAN. The women are the stalwarts of this committee, I agree.

[Laughter.]

Senator LINCOLN. We're hanging in there with you.

We want to thank, certainly, the chairman for bringing us together on this issue, and getting started on this debate and trying to figure out the solutions to the challenges that we face. We thank you all for bringing your expertise to our area of renewable energy.

Just a couple of questions. You know, I think we all agree that we need to take steps to reduce our greenhouse gas emissions. We need to encourage technology that's going to be maximize the renewable resources available to us. But, I do think that it's important for us to ask questions about how any standards we do set will ensure equity among the various regions of our country. You've heard that from so many of us. We come from all different parts of this great nation. We all feel like we have a tremendous amount to give, in terms of contributions to solving this problem ut, we also feel very strongly that we need to be recognized for the strengths that we have, and not punished because of the weaknesses that might exist in our areas.

In Arkansas, I'm extremely proud. We're contributing to the supply chain for wind energy by manufacturing the blades and the turbines. But, as Senator Landrieu showed you in that map, we don't

produce a whole heck of a lot of wind, except for those of us that talk a lot.

[Laughter.]

Senator LINCOLN. It is a critical part of making sure that we are allowed to make our contribution to the solution.

Arkansas has great potential to contribute to a new energy economy through biomass supply, not only in terms of—I think, Mr. Jones, you mentioned the broad definition, in terms of what the forest landowners and others can contribute—but agricultural waste, animal waste, there's a whole host of different things that we can do in different regions, but it has to be recognized as a contribution in helping to solve that problem, and I hope we will.

One of the things that hasn't been talked about an awful lot today, and I would like to just bring up, and that is the hydropower. In the current RES draft, the hydropower is excluded from the base amount from which the percentages are calculated. I've never really understood why existing hydro, in this debate, is not given more credit as a renewable energy source. It's something age-old that, for eons, civilization has used as a power source. Any of you all want to try to give somebody like me an explanation of why you think hydro is not talked about more often?

Mr. FURMAN. Senator, if I could take that on. The goal here is not to recognize, necessarily, existing resources, it's to reduce carbon, it's to, you know, create jobs and economic development, and it's to reduce our dependence on foreign imports, now or in the future.

If we could do that, we could recognize existing hydro. I think that, in order to accomplish those three goals, though, you would have to raise the numbers in the RPS, in terms of the targets.

Senator LINCOLN. What if you take it away?

Mr. FURMAN. I'm sorry.

Senator LINCOLN. What if you eliminate it?

Mr. FURMAN. Eliminate hydro?

Senator LINCOLN. Uh-huh.

Mr. FURMAN. We—

Senator LINCOLN. Existing hydro. Does that not set you back, in terms of what you're trying to accomplish?

Mr. FURMAN. This legislation won't do that, though. The existing hydro will continue to operate, just as the existing coal and the existing nuclear will continue to operate.

Senator LINCOLN. But, in terms of what you're saying, the contribution of carbon—I mean, obviously, that doesn't exist with hydro. In terms of, you know, taking that away as a source of power that exists today, you're going to have to replace it. I don't understand why it's not counted as something that is basically neutral, in terms of the environment.

Mr. FURMAN. To be clear, we're not taking away the hydro. All we're saying is, going forward—

Senator LINCOLN. You're not going to count it.

Mr. FURMAN [continuing]. You have to add new renewables into your portfolio.

Senator LINCOLN. Uh-huh.

Mr. FURMAN. So, it will continue to operate. We're not going to take it away. We're not going to even dis-incentivize anybody from

continuing to operate it. These plants are among our least expensive resources in the country for providing power, and I don't expect them ever to stop operating.

Senator LINCOLN. If you quit supporting them, they will.

Mr. FURMAN. No, they'll still be paid for by the market and by ratepayers. They will still be in the rate base, they will—Bonneville Power Administration will continue to generate and sell that power to the marketplace, and it will be very cost-effective.

Senator LINCOLN. I guess I tend to agree—disagree with you, in the sense that, you know, when you don't support things that, I think, are productive, then point in fact is, people are not going to use 'them. If it's going to be a part of how credits are traded and how people are evaluated, in terms of what they produce, particularly regionally, then it's going to become less and less of a viable source. People are not going to make the investment. I know, certainly, in terms of hydro facilities that exist today, it becomes harder and harder here to be able to find the resources to make the repairs in, you know, hydro projects that have been very, very successful and productive over the years. Yet, you know, being able to make the investment in the infrastructure for turbines and other things that need to be replaced or reworked becomes virtually impossible, and so, then you just lose that power.

Maybe we'll just have to disagree on that one. It seems—

Mr. FURMAN. I think we will.

Senator LINCOLN [continuing]. Seems like—it seems like—as I said, for eons it's been a great resource for mankind, something that we probably should continue to focus on.

Mr. Jones, in the South, and certainly in Arkansas, the use of biomass as a renewable energy, I think, must be utilized as much as we can in order to meet any future RES standard that's going to happen. There's an abundance of forest resources and infrastructure for the potential to process our forest biomass for energy use. You were concerned, I think, about the current definition of "renewable biomass." You've touched a little bit on that. I know you mentioned to Senator Landrieu, there—do you—anything else there that we need to be aware of?

Mr. JONES. Yes. The current definition that's being proposed in this piece of legislation really takes an agricultural or seasonal-crop approach to a long-term investment, like trees, which won't apply.

Senator LINCOLN. Right.

Mr. JONES. Basically, it's a closed-loop approach, which is very difficult for a long-term investment, like growing a stand of trees, to participate in. So, not only are we talking about excluding natural forests, but we're also taking the wrong approach to allowing them to participate.

Senator LINCOLN. Do you believe it's possible for States in the South to meet a strict renewable electricity standard if forests are restricted from being used to meet the standard?

Mr. JONES. I don't think so. We've talked about the regional differences, and Senator Landrieu's maps showed it very well and very clearly, that we do have some resource restrictions when it comes to wind and solar, but we do not have those restrictions when it comes to biomass resources in the South. You were correct to say that some ag products and animal waste products go in

there, as well. But, we have an abundance of forest resources in the southeastern United States that currently are losing their markets, the mills aren't located where everybody can access them now. These energy markets have the potential to set up right there, take a low-cost—basically take small trees—these are small trees that are being cleared out for—to increase forest health and manage for a higher-value product, and also the byproducts of saw-milling and waste from these manufacturing facilities. So, it goes to help, not only landowners, but the manufacturing facilities that we have, and preserve some of the jobs that are currently being lost—

Senator LINCOLN. Certainly—

Mr. JONES [continuing]. Through the reduction of industry.

Senator LINCOLN. Certainly one of the issues there is making sure there's parity, in terms of incentivizing these types of fuel uses, as well. So, that's important.

Mr. Chairman, I'd just also like to add my comments, that some of the other—my colleagues made, in terms of nuclear. Arkansas has been very successful, because it has been a diverse State, where it has used diverse power, whether it's been woody biomass, whether it is nuclear, whether it's hydro, whether it's coal, natural gas—we've tried to be—I think, set an example, in terms of what needs to happen.

I would just echo the comments of some of my colleagues, where we're not going to get from where we need to be unless we ensure that we're going to be looking at all of the resources that we have, certainly looking at them in a correct way, making sure that we're using the most efficient and effective ways that we possibly can, but making sure that we are recognizing all of the resources that exist before us. So, I hope we will, and particularly in terms of nuclear.

Thanks, Mr. Chairman.

The CHAIRMAN. Thank you.

Thanks, to all of you, for testifying. I think it's been a very good hearing, and we appreciate it. We will proceed to consider this further in the future.

[Whereupon, at 12:10 p.m., the hearing was adjourned.]

APPENDIXES

APPENDIX I

Responses to Additional Questions

RESPONSES OF DAVID A. WRIGHT TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Does the inclusion of energy efficiency help?

Answer. Yes. Energy efficiency should be included in any discussion about the need for clean energy. Energy efficiency reduces the need for generation and should be considered as a substitute for renewable generation in a RPS for areas where renewable resources may be limited. It certainly should be included in any federal mandate for certain mixes of energy sources. It should count as any other source and it should not be constrained by bureaucratic hurdles that do not apply to other energy sources (i.e. requiring a Governor to petition for its use) nor should its use be capped in counting towards compliance with a federal standard. While including energy efficiency will help mitigate the cost impact for Southeastern consumers, it will not eliminate the potentially significant cost of compliance with a Federal RPS.

(Alabama sent the following comment):

“If the overall intention of energy efficiency is to reduce emissions, then the effect of energy efficiency is the same as the production of zero-emission energy. The inclusion of energy efficiency is therefore vital to this discussion. However, it is also vital to appropriately and reasonably address the notion of minimum or maximum energy efficiency requirements. Because of regional variations in energy efficiency opportunity, states (and the utilities that serve them) should be given sufficient latitude to determine the kind and amount of energy efficiency measures to implement in their respective jurisdictions.”

Question 2. I have been troubled that energy efficiency credits may differ in value from program to program and from state to state. Should such credits be tradeable like renewables credits? Should they be limited to use for compliance only within the state that has petitioned for the right to use efficiency credits?

Answer. While each state has different avoided costs which impact the monetary “value” of an avoided MW or MWh, the same is true for renewable generation. If Renewable Energy Credits are tradable so should be Energy Efficiency Credits.

Energy efficiency should count like any other energy source toward meeting a federal renewables mandate. Accounting issues will exist with all fuel and energy sources and therefore trading of efficiency credits should not be constrained anymore than those for wind, solar, etc.

My thought is that energy efficiency credits that are tradeable from state to state would create a situation where the benefits of the efficiency improvements are seen in one state and paid for by another. These benefits would include not only lower emissions but decreased need for new generation. My initial thought is that energy efficiency credits, if used as a substitute for renewables, should be created and remain within each state. However, a cost/benefit analysis should be performed to consider the cost of an allowance created within the state versus outside of the state along with the impact on generation needs, emissions and lost revenues.

(A comment in response to this question from the North Carolina Utilities Commission):

“If a national market is created for renewable energy RECs, then it might not be inappropriate to allow a national market for energy efficiency RECs in order to reduce to the greatest extent possible the cost of compliance with a federal RPS.”

RESPONSES OF DAVID A. WRIGHT TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. How much back up power from conventional power plants is needed to meet a 20% RPS requirement by 2021? At what cost?

Answer. This will depend on what mix of renewable resources are used to meet the RPS. If all the resources are biomass, then very little conventional power plants are needed. If all resources are wind or solar, then anywhere from 75% to 100% back up is needed due to the unpredictability of the resource. The cost of the backup, based on adding simple cycle natural gas-fired combustion turbines to provide the needed reliability, would be approximately \$600-800/kW installed (in 2008 dollars). The need for this much backup generation will most likely be met through some combination of natural gas-fired intermediate and peaking type facilities.

Most of the renewable resources defined by the majority draft RPS that would count toward compliance are intermittent in their generation output and have low capacity factors. A recent study titled the "Joint Coordinated System Plan" (JCSP) was released by the Midwest ISO, PJM, MAPP, the Southwest Power Pool and TVA. It confirmed that wind generation has a capacity factor of 30%, requiring backup generation for the remaining 70% of power needs. Solar generation's capacity factor is typically even lower. This backup generation would almost always be natural gas-fired combustion turbines or combined cycle units.

This JCSP study examined the impacts of the eastern U.S. getting 5%, 20% and 30% of its electricity from wind. The study shows that to meet the demand for energy in the Eastern Interconnection from 2008—2024 with 5% wind would require the installation or import of 57,000 MW of wind capacity while the amount to meet a 20% wind requirement would require some 229,000 MW of wind. (At 2 MW each, this level would require the installation of 115,000 windmills.) The study also shows that each of these levels would also require the installation of substantial amounts of natural gas-fired capacity above the base case. The 5% wind scenario would result in the need for 46,500 MW of natural gas capacity above the base case, and the 20% wind scenario would require 67,200 MW of natural gas capacity.

Using 2008 EIA cost estimates for gas fired capacity, both wind scenarios would require tens of billions of dollars of capital investment above and beyond the costs of the renewable capacity.

Without significant improvement in storage technology, intermittent renewable generation resources, such as wind and solar, are not suitable to replace conventional base load generation resources.

Question 2. Do you agree that as it now stands, our country's transmission infrastructure is woefully inadequate to achieve a 20% by 2021 RPS requirement?

Answer. Speaking nationally, you may be correct when you say that our current transmission infrastructure is inadequate to support the amount of new renewable energy that is currently being contemplated. Without the necessary upgrades, the reliability of our nation's transmission grid will constantly be a concern. Similar to what we saw recently in Texas when the availability of wind generated electricity suddenly dropped in a matter of minutes, operators will continually be on heightened alert to ensure a constant and steady supply of electricity generated from renewable resources, as well as back-up capacity, is available.

The same is not the case in the Carolinas, however. While the grid may not currently be constructed to wheel power from remote, unpopulated locations in some parts of the country where there is a great wind potential, it is adequate to handle biomass and distributed generation, e.g., solar, without major upgrades. In the Carolinas, much of the wind potential can also be accommodated without major upgrades. The grid was never intended to deliver offshore wind power or wave/tidal power, but even these sources may be delivered once the infrastructure is added to get the power on shore.

The existing grid is highly reliable and serves its intended purpose of delivering the most economic sources of energy to customers. The impact of renewable resources should be addressed on a local or regional basis, rather than attempting to overhaul the entire system.

Question 3. What are the estimated infrastructure costs to meet the legislation's requirement? How realistic is it to get the necessary transmission in place in time to meet the hard and fast deadlines of the national mandate? Should Congress build some flexibility into the program if inadequate transmission prevents compliance?

Answer. Yes, flexibility should be built into the program if transmission capacity limits renewable resource availability within individual states and to account for disparities in the amount of renewable resources available within a given state.

The JCSP study cited above examined two different resource and transmission paths to serve a total of 745,000 MW of coincident peak load in the Eastern Interconnection (except Florida) in 2024. The Reference Scenario, which assumes that

present RPS requirements are met with local on-shore wind resources, would add 10,000 miles of new extra high voltage transmission at an assumed cost of approximately \$50 billion. With 5 percent of the Interconnection's energy coming from wind and 54 percent from base load steam generation, total energy production costs in 2024 would equal \$104 billion and total generation capital costs would equal \$674 billion.

In contrast, the 20 percent Wind Energy Scenario, which assumes a 20 percent national RPS requirement such as proposed in the majority draft, would add 15,000 miles of new EHV transmission at an assumed cost of approximately \$80 billion if met by U.S. on-shore wind development. Under this scenario, energy production costs in 2024 would equal \$85 billion and the capital cost of new generation would equal \$1,050 billion. These results should be viewed as illustrative or "ballpark" costs rather than definitive findings about the costs of new transmission and generation related to either the status quo expansion path or a high-renewables scenario. Even with that caveat, the findings suggest that transmission overlays should be strongly considered as a way to improve the future reliability and economics of the nation's bulk power electric system under either policy path.

Siting new transmission infrastructure is a contentious issue that needs to be addressed. If new transmission is not available, it will not matter how much renewable energy is produced because that energy will not be available for delivery. In that case, Congress needs to ensure that states and consumers are not unfairly penalized for something beyond their control.

(Comments in response to this question from the North Carolina Utilities Commission):

"We have no estimates about infrastructure costs to meet the proposed federal RPS. Although the development of renewable resources in other regions has created a backlog of transmission interconnection requests, we believe that we have adequate transmission planned or in place in North Carolina to meet our REPS requirement (12.5% by 2021, up to 40% of which can be met with energy efficiency savings) with in-state or regional generation resources."

Question 4. Given the different goals and definitions of renewable energy in the various state renewable energy standard programs, how does the majority staff draft ensure consistency and coordination of the state and federal programs?

Answer. There is general consensus that the following resources are considered renewable: solar photovoltaic; solar thermal; wind; biomass; wave and ocean current. However the draft program does not recognize the useful thermal energy created from a combined heat and power system using a renewable resource, such as biomass.

While the majority staff draft does recognize the ability of states to have their own RES programs it does nothing to ensure consistency and coordination. In fact, if a state has an RES program that is in any way different than the majority draft, then a utility in that state will have to comply with both the state and federal requirement. Currently some 28 states have RES programs and almost all are different in some respect than the majority draft either in the definition of what qualifies as "renewable", in percentage requirements, the level of alternative compliance payments or in the timelines for achieving levels of renewable energy. Each utility will be forced to comply with both state and federal requirements even if different.

(Alabama sent the following comment):

"The majority staff draft should recognize the unequal distribution of renewable resource potential as well as the unequal distribution of load obligations throughout the country. Areas of low renewable potential and high electrical demand are inherently disadvantaged by nature of their resource allotment and the incumbent economic base in their area. One size will not fit all."

(Comments in response to this question from the North Carolina Utilities Commission):

"It purports to require coordination, but doesn't practically do anything to ensure consistency and coordination of the federal and state programs. It includes its own definition of renewable resources that may or may not coincide with a particular state's definitions. It gives no credit for renewable generation that may be allowed in a state but not in the federal definition. We have seen drafts [the House draft, we believe] that are more limiting in the definition of biomass, for example, such as limiting forestry residues to biomass on federal lands. Some drafts do not include non-electric energy production such as solar thermal and waste heat recovery, both of which are included in the North Carolina REPS."

Question 5. Do you agree that any federal RPS program must account for the regional variations in the supply of renewable resources?

Answer. Yes. All states do not have the same amounts or levels of renewable resources as defined in the majority draft. Therefore, unless these innate differences are recognized, if a penalty kWh charge is levied for non-compliance, or out of state RECs must be purchased to satisfy the requirement, all that is being accomplished is a wealth transfer. Even when regions have native resources (i.e., solar in the west, wind in the mid-west, biomass in the Southeast) it makes no sense to establish one standard for each region's resources. Any federal mandate for energy sources must allow a region to take into account the resources that economically exist in that region. Otherwise utility customers are merely making payments for RECs or alternative compliance payments that don't return any value to those same customers. As I mentioned in my appearance before the Committee, a more logical approach to a federal mandate than the majority draft would be to require each state to adopt an RPS that is consistent with the energy resources available in that state or region. That would make more sense for the energy needs and utility rate-payers of that region.

(Alabama sent the following comment):

"Yes. If regional variations are not considered, then the government would in effect be promoting economic discrimination in the name of promoting renewable energy."

(Comments in response to this question from the North Carolina Utilities Commission):

"Any federal RPS program must absolutely account for regional variations in the supply of renewable resources. While a federal RPS may ignore state boundaries with regard to compliance, it must respect the decisions of states which enact their own RPS to encourage development of indigenous renewable resources."

Question 6. I know you're concerned that the Southeast is penalized under a national program because the region lacks sufficient wind or solar power. Proponents of a federal mandate, however, insist that the Southeast can meet the new requirement through the use of biomass. How do you respond?

Answer. Biomass is a resource available in the Southeast, but its use to generate 20% of retail sales is not practical. Those who say the Southeast can comply with a RPS with biomass greatly underestimate the amount of energy needed to provide 20% of retail sales, and they overestimate the ability of biomass to meet the requirements. For one thing, much of the biomass technology is currently in the research and development stage, and not commercially proven as to operation or cost. In addition, an estimate for the area of the Southeastern Electric Reliability Council (SERC) shows that for the utilities in the region to meet a 20% RPS with biomass would require some 17,500 MW of biomass generating capacity. To fuel that capacity would require the annual collection, transport and burning of almost 200 million tons a year of biomass. To grow that much biomass would require tens of millions of acres of land to be able to plant and harvest that many tons on an annual basis. Such a commitment of land would not be practical and the planting, harvesting and transport of such an amount would have tremendous impacts of its own.

The December 2006 La Capra study, Analysis of a Renewable Portfolio Standard for the State of North Carolina, found that North Carolina could only achieve about 7% energy of its energy needs from biomass (including wood and agricultural waste, landfill gas and animal waste) by 2017. In Florida, the Navigant study, Florida Renewable Energy Potential Assessment, showed that biomass (existing and new, but excluding MSW, which does not qualify under the federal proposals) could only provide up to 6 or 6.5% of the state's energy requirement by 2020 in the most favorable circumstances. In South Carolina, the La Capra study estimated practical biomass potential to be about 4%.

Speaking specifically of the concerns I have heard from the state of Georgia, while biomass is Georgia's best source of renewable energy, it is also limited. Plant size is generally limited to less than 100 MWs, with fuel supplies coming from within 50 miles of the plant. Building 2000 to 3000 MWs of biomass in Georgia may not be possible due to limits on fuel supply. A study of the maximum biomass potential in Georgia needs to be considered. Competition for fuel sources between plants and with the pulp, paper and timber industry may drive prices higher and may push industry out of the state.

(Alabama sent the following comment):

“This statement fails to consider the dangers of over utilization of biomass and the corresponding impacts to those interests that already rely on these resources. Alabama, for example, does have substantial biomass resources that could be used for electricity generation. However, to fully meet the Federally mandated RPS requirements using biomass could require as much as 30% of the state’s commercial pine forest lands (roughly 2.8 million acres or 4400 sq miles).

If Alabama generators attempted to meet the RPS requirement with biomass alone, it would mean:

- Wood prices in the South would rise enormously, just as the price of corn did when this crop was converted from a food crop to an ethanol crop.
- Pulp and paper making in Alabama, and across the South, would be severely threatened, potentially costing thousands of jobs.
- The cost of electricity would rise, imposing added costs on families and businesses. Rising costs on businesses would, in turn, eliminate more jobs in the region.
- Rising cost of electricity would put the state and the region at a considerable disadvantage in attracting new industry because other sections of the country, blessed with abundant solar and wind resources, would not experience the same increases in costs.”

(Comments from the North Carolina Utilities Commission in response to this question):

“No, we do not believe that North Carolina can meet the proposed federal RPS standard solely through the use of biomass. North Carolina adopted an aggressive REPS given the potential for renewable energy development, including biomass, in the State. This also includes a significant amount of wind energy development and an allowance for energy savings from the implementation of energy efficiency measures. Even so, the North Carolina REPS requirement increases only to 12.5% (5% of which can be from energy efficiency)—far less than the 20-25% proposed in drafts of federal legislation. As a part of its REPS, North Carolina allows utilities to purchase renewable energy RECs from out-of-state to meet up to 25% of their REPS requirement. We expect that utilities will take advantage of this provision both for resource availability and cost considerations.”

Question 7. Some dismiss the argument that the RPS will result in a wealth transfer from areas of the country that lack renewable resources to those that are blessed with them. As a state regulator, can you explain why you believe a federal mandate will result in increased rates for those in the Southeast?

Answer. The cost of energy produced by the limited renewable resources in the Southeast is two to three times greater than the cost of energy produced from traditional sources. Requiring the use of the higher-cost renewable resources will increase the cost of power, which will be recovered through rates paid by consumers. In addition, many renewable resources such as wind and solar are intermittent and therefore some amount of traditional capacity must be available to backup these resources which will add additional cost. Another option is to purchase RECs. But if a utility must purchase RECs to satisfy a federal RPS and does not also get the kWhs of energy they represent, it basically is paying twice for the energy needed to meet its customers’ needs. If it also receives the kWhs, it will be paying a premium for such RECs and kWhs, thus driving up the price of electricity for that state.

According to the draft proposal, excluding energy efficiency, there are essentially three ways for a utility and its consumers to comply with the renewable portion of the mandate: (1) build or contract for renewable energy to be delivered to electricity consumers served by the utility; (2) buy a renewable energy credit (REC) from designated renewables placed in service after January 1, 2006; and/or (3) pay an alternative compliance payment (ACP) of 3.0 cents per kWh.

Unlike other areas of the country, the Southeast is not blessed with enough available resources for all the utilities to build or contract for the amount of renewable generation that each of them will be required to supply to their consumers under the majority’s draft proposal. While many supporters cite the availability of biomass as an option, what those supporters fail to acknowledge is that there will be competing interests for this fuel source. Congress recently increased the mandate for renewable fuels, which means more will need to come from cellulosic biomass. This will be on top of what the pulp and paper industry already uses to produce its product. Add to that the need from the energy industry and you are looking at substan-

tial competition among sectors for the same product. As we all know, when demand for a product outpaces supply, prices tend to increase.

As a regulator my main concern is to ensure consumers are protected and are provided with safe and secure low-cost electricity. This is especially important in the Southeast where the cost of energy makes up a significant portion of their monthly household budgets.

Because of the lack of available wind or solar resources, biomass would have to be counted on for compliance. If biomass cannot provide the amount of electricity that is required to meet the annual requirement then utilities and their consumers will have only two options available to them for compliance—either buy a REC or pay the ACP. During testimony it was somewhat glossed over, but the fact is that no electricity comes with the ACP or the REC. Therefore, consumers will continue to pay, like they do today, for the electricity needed to keep their lights on, but they will also be required to pay extra for either the REC or the ACP under the new mandate.

Neither the REC nor the ACP will provide these consumers with any additional benefit for what they are required to pay. Instead, the required payment will either be sent to states that have the resources available, helping them expand their economic development initiatives, or go to the federal government for new government programs subject to appropriations. To force consumers to pay additional costs, not because they refuse to do something, but because they can't do it, seems unjust, unfair and unreasonable.

Back in 2005 this Committee passed a mandate requiring a certain amount of fuel sold in the U.S. to contain renewable fuel, such as ethanol. And in 2007 Congress increased this mandate. A lot of people support this mandate as a way to reduce our dependence on foreign oil, and I think it can provide some context to today's debate on renewable electricity. What if Congress changed the law and said that instead of applying nation-wide, the mandate required fuel sold in each state to contain a specific amount of renewable content—I assume there would still be significant support for the program. Now, add that the renewable content can only come from sources grown in that state and can only be sugarcane, rice or cotton.

If the requirement is not met, then the federal gas tax is increased by 2-3 cents per gallon. This, at its very core, is what Congress and supporters of a one-size-fits-all renewable approach are contemplating for the electricity sector—do it using these resources or pay a penalty.

(Alabama sent the following comment):

“As currently proposed, the RPS defines renewable fuels only as solar, wind, geothermal, ocean energy, landfill gas, biomass, and new hydro. Solar and wind are not viable broad-scale generation technologies in Alabama. Biomass has some potential, but even it is limited. Given this, plus the fact that no consideration is given to either nuclear or existing hydro, Alabama will be left with little alternative but to buy its way into compliance through the purchase of Renewable Energy Credits Alternative Compliance Payment. Unfortunately, for Alabama, this reduces an RPS to nothing more than a transfer of wealth or a tax.

Interestingly, and perhaps ironically, the Department of Energy's own study ranks Alabama 6th in the nation and 1st in the Southeast in the use of renewable generation. Importantly, this study takes into account Alabama's existing hydro generation. generation that is excluded under the proposed standard.”

(Comments from the North Carolina Utilities Commission in response to this question):

“By definition, renewable generation requires a premium over conventional generation in the Southeast. Otherwise, renewable developers would not need a state or federal RPS to increase the amount they are paid for their electric generation. If utilities are required to purchase renewable generation as an alternative to conventional generation, these additional costs must be passed through to their customers—resulting in higher utility rates. States, if they desire, should be allowed the freedom to develop indigenous renewable resources to supplement conventional generation to support policies of improved air quality and reduced carbon emissions. Stakeholders and policy-makers in North Carolina, in adopting a REPS, have reached agreement on how much consumers are willing and should be required to pay to fund renewable generation yet avoid job losses due to increased electricity rates.”

Question 8. In the Southeast, only North Carolina has adopted a state renewable mandate. How does that program differ than the federal program proposed in this

draft legislation? How would North Carolina's program, and its ratepayers, be impacted by the adoption of a federal mandate?

Answer. The NC Utilities Commission authorized an independent study to look at the feasibility of implementing an energy portfolio mandate. It came to the conclusion that NC could implement a standard, but much less aggressive than what is being contemplated at the federal level. The NC standard has a more reasonable long-term goal of 12.5 percent by 2021 and more realistic interim requirements to meet this goal. Unlike the majority proposal, the NC standard also has price caps—capping the amount consumers will be forced to pay as a result of the policy.

When a federal standard is implemented, much of the investment being made at the state level will be diverted in order to try and comply with the federal requirement. When there are certain carve-outs at the state level (like swine and poultry carve-outs in NC) investment must continue in those areas even if they do not comport with the federal standard. There will continue to be questions of how competing standards can work together without the federal standard replacing what the state has diligently put in place.

The NC REPS differs from the federal proposals in several ways, including:

- a lower requirement; the highest North Carolina REPS requirement is 12.5%.
- a higher allowed percentage from energy efficiency; up to 40% of the highest REPS requirement can be satisfied by energy efficiency savings.
- the presence of a monetary cap on compliance costs which protects customers from excessive rates.
- no alternative compliance payment.
- the inclusion of solar thermal and waste heat recovery.
- Because the federal proposals impose a substantially greater RPS requirement and lack any cost cap, the costs to North Carolina citizens will be much greater under the federal proposals than the North Carolina REPS. RPS compliance costs to North Carolina residential ratepayers could easily triple under the federal proposals as compared to the NC requirements.
- The NCUC has the authority to modify or delay the program if that is in the public interest.

Question 9. You propose that before Congress moves forward with a national RPS, we should first direct those states that don't already have a program, to create one. Would the states support such an action? If so, how quickly could states without current programs develop those programs?

It is unrealistic to assume that states can meet the mandates of a federal 'one-size-fits-all' renewable policy. More than half the states have passed some form of an advanced energy portfolio, but I do not believe any of these programs directly align with what Senator Bingaman and others are proposing. While some states have chosen to implement energy portfolios, others have assessed their resources and decided otherwise. As Senator Bayh indicated during the hearing, Indiana looked at implementing a standard and chose not to. They concluded they did not have the resources available for such a standard. So, is the federal government simply going to tell those officials that they were wrong and simply didn't look closely enough?

States are in the unique position to decide what is best for their constituencies when it comes to delivering in-state electricity. They are positioned to gather all the necessary information and make an informed decision on what is available and how to provide incentives for increased energy generation. North Carolina did this and is the first southern state to implement a renewable standard. But North Carolina, like other states that have implemented similar programs, included a price cap on the amount the program could cost consumers. In North Carolina the maximum annual cost of the program to each class of customer is capped as follows:

	2008–2011	2012–2014	2015 and thereafter
Residential	\$10/year	\$12/year	\$34/year
Commercial	\$50/year	\$150/year	\$150/year
Industrial	\$500/year	\$1,000/year	\$1,000/year

One way to ensure states move forward on implementing some type of energy standard is to set a federal floor and then, like transportation funding, have future federal funding for renewables tied to states implementing a program that equals or goes beyond the federal level. This carrot approach, as opposed to the stick mentality currently being advocated at the federal level, would incent states to move forward as quickly and as reasonably as possible without being punitive in nature.

(Alabama sent the following comment):

“Inherent in the notion that any State would develop its own RPS is the assumption that it would do so in a way that makes sense for that State. For Alabama, it is reasonable to assume such a program would most certainly include existing hydro. It is equally reasonable that such a program would be largely void of solar and wind requirements. That being the case, given the requirements of the current proposed Federal RPS, development of such a program would appear to be an exercise in futility. If, however, State programs were to be deemed as satisfying any Federal requirement, then such a pursuit would be more worthwhile and would be more likely to gain support.”

(Comments from the North Carolina Utilities Commission in response to this question):

“Each state should have the opportunity to decide what is appropriate for itself given the diversity of resources available in the state or surrounding region. In addition, states should be able to assess how costly they are willing to let electricity become in order to gain the advantages of renewable resources. State policy-makers are accountable to the electorate for increases in the price of electricity due to renewable policy. While Congress may wish to consider how best to encourage states without and RPS to adopt such a program, it should respect the decisions with regard to cost, resource eligibility, etc. made in those states that have already adopted and RPS. Federal policy-makers should respect the decisions already made in North Carolina and other states regarding how much their citizens should be required to pay for green energy and to what degree they are willing to accept unbundled renewable energy RECs from out-of-state.”

RESPONSE OF DAVID A. WRIGHT TO QUESTION FROM SENATOR LANDRIEU

Question 1. I know that we can achieve efficiency gains in both the interstate transmission of electricity as well as the retail distribution of electricity. In Sen. Bingaman's draft language that has been circulated, it only allows for savings from the retail distribution of electricity. Don't you think there are huge efficiency gains to be made through efficiency upgrades to our transmission backbone? Shouldn't that also be included in any efficiency portion of a RES?

Answer. There are gains to be made in transmission grid efficiency, and the savings should also be encouraged and recognized in any efficiency portion of a RES. While losses on a transmission grid are relatively low as a percentage of the power transferred, the magnitude of the power transfers would produce significant savings for even small gains in efficiency.

So the simple answer to this question is yes, but with consideration given to cost-effectiveness, too. Recently, the subject of increasing the reliability and efficiency of our transmission grid has received a lot of attention, especially when it comes to connecting renewable energy to the grid. The fact is, development of renewable sources will be in rural areas and the electricity generated will need to be transported over long distances to serve the load centers. At this point it would seem that the transmission needed to carry renewable energy to those load centers is just as important as erecting the wind turbines or solar panels which would supply the power.

If this measure is truly intended to be a first-step in addressing climate change, the question that needs to be answered is why should we artificially limit the investment that utilities can make in energy efficiency? According to the proposal, only 25 percent of the yearly requirement can come from energy efficiency. This means that utilities can only invest a certain amount in energy efficiency and then they are required to re-direct investment to paying for needed RECs or ACPs. It would seem more logical that utilities be allowed to meet as much of the requirement as possible through energy efficiency. At least then consumers of those utilities would see actual benefits from the program. In the recently enacted stimulus package Congress provided approximately \$20 billion for energy efficiency. This shows that efficiency is critical and it seems inappropriate for Congress on the one hand to provide so much public funding for it, but on the other hand limit the amount of investment by the private sector.

Additionally, since increased transmission is critical to bringing new renewables onto the grid, it would seem that investment in transmission upgrades should count towards achieving compliance with the standard. In this way, the RPS requirement could be seen as a tax liability and investment, up to a certain point, and could be used as a tax credit—offsetting the costs associated with not achieving the renewable amount required under the mandate.

(Alabama sent the following comment):

“Opportunities for energy efficiency gains, while most likely yielding more potential at distribution levels, should not be limited to those locations. Utilities should have the liberty to try and achieve efficiency gains where they are most warranted (distribution or transmission).”

(Comments from the North Carolina Utilities Commission in response to this question):

“Utilities should be encouraged to increase efficiency in all aspects of their operations, including electric generation, transmission and distribution.”

RESPONSES OF DAVID A. WRIGHT TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What are we trying to achieve through a Renewable Electricity Standard (RES)? What are the goals? By focusing solely on renewables, are we limiting our options to achieve an adequate supply of clean, low-carbon, reliable and affordable electricity?

Answer. Yes, by focusing solely on renewables, we are limiting our options for achieving an adequate supply of clean, low-carbon, reliable and affordable electricity. If the goal is to reduce carbon emissions, and encourage clean, safe, reliable, low-carbon and affordable sources of electricity, then other options such as nuclear power should be included.

Our goal should be to encourage all clean energy sources to meet our future energy needs. We should not focus only a narrow definition of certain energy sources like wind, solar, biomass and geothermal. That narrow definition does not even include all renewable sources since the majority draft does not include hydro-electric energy.

The federal government should not pick winners and losers for certain energy technologies. States and regions should be able to focus on meeting their energy needs in ways that make the most sense for their economies and ratepayers.

(Alabama sent the following comment):

“The goals of any Renewable Electricity Standard should be to improve air quality, lower American dependence on foreign fuel sources, and encourage clean, economical, dependable electric generation. To achieve these goals, any Renewable Electricity Standard must include and encourage the use of clean alternative fuels including nuclear energy and clean coal technology. Any Renewable Electricity Standard must ensure that States are given sufficient latitude to pursue the inclusion of clean energy alternatives that make sense for their individual economies.”

(Comments from the North Carolina Utilities Commission in response to this question):

“Many states, in addition to the reduction of carbon emissions, have enacted an RPS to support the following policy goals: (1) improved air quality from reduced emissions from conventional fossil-fired generating facilities; (2) increased energy independence through the development of indigenous energy resources, such as wind, biomass, solar, hydro, etc.; (3) increased economic development and increase of local tax base from the construction, operation, fuel collection, and other activities associated with indigenous energy resources; and (4) the potential to attract manufacturers and other “green” jobs associated with an increase in demand for renewable generation in the state. A federal RPS with national markets for renewable energy RECs supports none of these additional goals. Rather, it merely creates a rush to purchase credits from wind-rich regions, thus straining the transmission infrastructure in those regions while providing no local economic benefit to those required to pay the bills. North Carolina has already decided what its citizens are willing to pay for the benefits of locally-sited renewable energy.”

Question 2. If the main concern surrounding RES is to have clean energy then we should consider nuclear power. Nuclear power is produced in the United States, it has zero carbon dioxide emissions, and it does not put stress on agriculture prod-

ucts or the timber industry. Why has this source not been considered in the RES discussion?

Answer. Nuclear power absolutely should be included in any conversation about clean energy. Unfortunately, some supporters of a federal RES also oppose nuclear power. Nuclear is the only base load electricity source available that has zero emissions of greenhouse gases or other pollutants. A federal RES that imposes the same standard across the country will result in ratepayers in some regions sending their money to purchase RECs or make alternative compliance payments to the federal government. Such money could be invested in clean energy sources like nuclear that can reliably and cost effectively serve those areas.

Some environmentalists have refused to acknowledge that if the goal is to reduce carbon emissions, nuclear generation is a cost effective viable solution that must be considered. There is not one legitimate argument to exclude nuclear. The concerns raised most often are "safety" and spent fuel storage. Regarding safety, this argument was debunked decades ago. Nuclear generation for electricity and nuclear powered military ships has been safely operated for over 40 years.

Regarding spent fuel storage, the US is obligated to take possession and build a national repository. Even in the event this does not happen, safe on-site storage is available and has been tested over time. In addition, while the supply of uranium to fuel nuclear reactors is finite, as reprocessing of used nuclear fuel becomes more prevalent and economic, nuclear fuel becomes virtually renewable.

(Alabama sent the following comment):

"That nuclear energy has been excluded from this discussion is indeed puzzling. Nuclear plants don't burn fossil fuels, therefore they produce zero air emissions. Nuclear generation is the only large-scale, clean-air electricity source that can be expanded widely to produce large amounts of electricity in the Southeast in general and Alabama in particular. Any Renewable Electricity Standard should focus on lowering emissions and encouraging cleaner production of electricity. Clean generation sources, like nuclear, must be part of any serious discussion of this issue."

(Comments from the North Carolina Utilities Commission in response to this question):

"While it may be appropriate to credit nuclear energy in greenhouse gas reduction policy, we did not find it necessary to include nuclear power in the NC RPS. Nuclear energy is a relatively mature technology and receives its own economic subsidies. Nuclear generating facilities already provide a substantial amount of energy in North Carolina and other states, and a number of new nuclear facilities have been proposed. Nevertheless, we agree that the option for future development of nuclear power must be maintained. One important hurdle continues to be the inaccessibility of funds in the Nuclear Waste Fund for the development of the Yucca Mountain repository. North Carolina consumers are one of the largest contributors to that fund."

Question 3. Why do you include energy sources that may yield some benefit in the future and do not have any short term benefits, but continue to exclude nuclear power that has both short term and long term benefits?

Answer. SEARUC and the utilities in the Southeast support nuclear power as a clean, reliable energy resource. As discussed in the answer to your second question, I believe that all clean energy sources should be utilized in meeting our future energy needs and that certainly would include nuclear power.

(Alabama sent the following comment):

"Nuclear generation must be a part of any serious discussion of a Renewable Energy Standard."

(Comments from the North Carolina Utilities Commission in response to this question):

"Just as with renewable energy resources, each state's decision with respect to the extent of use of nuclear generation should be respected. Utilities in North Carolina are looking at nuclear as well as other options to meet their obligation to provide safe, reliable power at a reasonable cost to consumers."

Question 4. The US consumes approximately 1000 gigawatts of electricity every year. The RES legislation would require approximately 200-220 gigawatts to come from renewable energy sources by 2020. What percentage of the renewable energy mandate will be supplied by wind and why does wind have a larger potential than other renewable sources such as hydro or nuclear?

Answer. Wind does not necessarily have greater potential than nuclear; however, nuclear power is not included in the list of eligible resources listed in the draft proposals. While there are significant wind resources in the U.S., not all regions of the

country have readily available, cost effective wind resources. The majority of potential wind resources available in the Southeast are offshore and face technical and economic challenges that on-shore resources in other areas of the country do not.

It is difficult to say how much of a 20% RPS would be met with wind in all parts of the country. Georgia tells me, very little will be contributed by wind unless their utilities purchase wind tags from other states.

Obviously states in the west and upper midwest would have a greater ability to rely on wind to meet renewables requirements than other regions. But, even in those states, as compared to other sources like nuclear or hydro, wind would have a lower capacity factor and be more unreliable. Wind generation will also require the installation of large amounts of natural gas generation to provide the power when wind power is not available. Recent studies have shown this could be up to 70% of the time.

(Alabama sent the following comment):

“The Southeast in general and Alabama in particular, will be virtually unable to rely on wind energy to meet any RES requirement. A sustained wind of about 14.3 mph is the threshold for reliable wind generation. The vast majority of locations in Alabama do not meet this threshold.”

(Comments from the North Carolina Utilities Commission in response to this question):

“While the potential for new wind development may be larger than that of hydro (because of opposition to new impoundments and the prior development of significant hydro resources), its potential is not likely larger than nuclear. In addition, nuclear and wind have different operating characteristics that do not make them comparable. Nuclear operates at 95% capacity factor, while wind operates only when the wind blows and cannot be relied upon to operate when its power is needed. Thus, much more wind capacity is necessary to generate the same amount of energy as from a conventional generating facility. Even then, the actual generation from wind may be zero when needed on a hot summer afternoon.”

Question 5. In your opinion, how will the Southeast states meet their mandate requirements since wind is not a significant energy source in this region?

Independent studies have shown the most readily available renewable resource is biomass, primarily wood waste from the forest industry. However, studies in North Carolina, South Carolina and Florida estimate that biomass can practically provide only about 4 to 7% of utilities’ retail sales, leaving a significant gap to meet a 20% renewable requirement. Solar generation would also play a part; however, solar generation is currently one of the most costly renewable resources, which may limit the amount installed due to other competitive renewable resources available in other regions of the country.

I believe that the Southeast can meet limited amounts of the proposed RES mandate requirements with energy efficiency and possible conversion of some older coal plants to biomass, new construction biomass including landfill gas, and also co-firing of existing coal facilities with wood and/or agricultural waste. But, utilizing these resources will increase costs to the ratepayer. Energy efficiency is limited to 5% of the 20% mandate and it is not practical for biomass to meet the 20% requirement either. I believe most of the compliance with the federal RES in the Southeast will come from either purchasing RECs from other regions or making alternative compliance payments to the federal government.

(Alabama sent the following comment):

“Assuming that nuclear and existing hydro are excluded (which they shouldn’t be), Alabama will left with little choice but to resort to the purchase of Renewable Energy Credits of payment of an Alternative Compliance Payment (ACP). Biomass does hold some compliance opportunity for the Southeast, but even it is limited.”

(Comments from the North Carolina Utilities Commission in response to this question):

“Utilities in Southeastern states will have no option in meeting such a high federal mandate but to purchase renewable energy RECs from out-of-state or purchase credits from DOE”.

Question 6. How will a RES affect the price of electricity in Southeast states?

A Federal RPS proposal, such as that proposed by Senator Bingaman, could easily increase rates in the Southeast by 5 to 6%. More aggressive requirements, such as the 25-by-25 proposal, could increase rates by 11 to 15%. As noted in the North

Carolina La Capra study, costs are not scalable because higher RPS requirements will necessitate greater use of higher cost resources.

Prices will increase if Southern states are required to build or purchase renewable energy when other forms of energy are cheaper. It is unavoidable that ratepayers will pay more for electricity due to the imposition of a federal RES. Resources, like biomass, that are available in the region have a higher cost than the current energy sources of coal, nuclear and hydro. The gap between what can be achieved with energy efficiency and biomass will have to be met by either purchasing RECs from other regions or making alternative compliance payments to the federal government. Billions of dollars will be paid by ratepayers in the Southeast for this program. This could equate to several hundred dollars a year in higher electric bills to the individual ratepayer. This money will mostly be sent to other regions or the federal government rather than being available to invest in energy infrastructure to meet the future needs of the state or region where the ratepayer lives.

(Alabama sent the following comment):

“An RES will cause electricity prices in Alabama to rise precipitously. Unfortunately, because Alabama would likely have to comply with an RES (at least as currently proposed) through the ACP, Alabama ratepayers will see absolutely no benefit associated with compliance.”

(Comments from the North Carolina Utilities Commission in response to this question):

See answer to Senator Murkowski, Question #7.

RESPONSE OF DAVID A. WRIGHT TO QUESTION FROM SENATOR MARK UDALL

Question 1. Currently, does each state rely exclusively or substantially on fuels derived from that state to generate electricity? Particularly for the Southeast, where does the fuel come from that currently provides electricity generation?

Answer. This was an issue that was also discussed during the hearing. Approximately 45% of the electric generation in the Southeast is provided by coal, which is procured predominately from the central and northern Appalachian region. 35% is provided from nuclear generation and the balance is from natural gas, oil and other sources.

While a great deal of the fuel used to generate electricity comes from out-of-state, there are significant differences in relying upon out-of-state traditional fuels as compared to relying upon intermittent renewable resources to generate electricity in another region of the country which is then delivered over transmission lines.

1) The total cost of electricity generated from coal and uranium is very economical compared to the total cost of renewable resources.

2) Supplies of coal and uranium fuel can be managed to maintain sufficient fuel inventories to ride through high prices and/or supply disruptions and continue to generate low-cost electricity. The delivery of renewable-generated electricity from some other region over transmissions lines is not as reliable due to the intermittent nature of renewables such as wind and solar, and also because delivery of the energy is subject to interruption due to transmission line outages resulting from storms or other causes.

3) The cost of the additional transmission lines necessary to deliver large amounts of energy from another region will be costly, and siting of the lines will be controversial and time consuming.

4) The transmission of electricity over long distances, such as from the Midwest to the Southeast, would result in significant electrical losses which will reduce the amount of electricity actually delivered. These losses are avoided when electricity is generated in closer proximity to load centers where it is delivered to end-use customers.

5) Although the fuel is imported, the investment in generation, transmission and distribution remains in the state and creates jobs in the state. Such is not the case with renewable resources located outside the state.

While it is correct that coal, natural gas and uranium are imported by states for generation purposes, it is usually more cost effective to transport fuels such as uranium, coal or natural gas than to transport electricity. That is why generation has almost always been built near the load. In addition, it does not follow that wind and other renewable resources could be substituted for current electric generation in these states. Under this theory wind or solar would have to be imported and then used to generate electricity to displace the current generation in a state—which cannot be done.

Even if the transmission capability existed to import all the electricity required to meet the standard, it would be at an increased cost to consumers and would not provide the local economic benefits that electricity generated in-state would carry. Also, if the RES is supposed to be a step to reducing carbon then why not look at nuclear generation? Increasing the amount of nuclear generation would increase local economic development and increase local job creation, both during construction and long-term plant operation.

As I have stated in previous questions, the REC or the ACP does not provide any electricity. Therefore, customers in those states that lack renewable resources would still have to rely on their current electric generation in addition to paying the costs for the REC or ACP, all for no additional benefit.

(Alabama sent the following comment):

“Many states meet a material amount of their electric generation fuel needs within their state. Alabama is no exception, and sources much of its fuel needs from in-state coal, natural gas, hydro, as well as some biomass from customer owned generation facilities. In the United States electrically utilities source almost all of their fuel needs within the country. This is largely due to the reliance on and abundant availability of coal within the United States.”

(Comments from the North Carolina Utilities Commission in response to this question):

“Utilities in North Carolina primarily rely on coal, nuclear, and natural gas for electric generation—each of which is purchased from out-of-state. This, in part, led North Carolina to adopt an RPS to support development of indigenous energy resources, such as small-scale hydro, solar, wind, and biomass. In addition to the increased energy independence, development of in-state energy resources provides for local air quality improvements and local economic development. The difference between purchasing fuel from out-of-state and purchasing renewable energy RECs from out-of-state is that in the latter case consumers are incurring an additional cost with no additional benefit”.

RESPONSES OF RALPH IZZO TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. How much back up power from conventional power plants is needed to meet a 20% RPS requirement by 2021? At what cost?

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

Question 2. Do you agree that as it now stands, our country’s transmission infrastructure is woefully inadequate to achieve a 20% by 2021 RPS requirement?

Answer. Whether or not our transmission infrastructure is adequate to support 20% renewable generation depends entirely on where renewable generation is built. For example, with significant growth in offshore wind generation located close to electric load centers in the Northeast, you could expand our nation’s renewable resources significantly without major new transmission infrastructure.

Question 3. What are the estimated infrastructure costs to meet the legislation’s requirement? How realistic is it to get the necessary transmission in place in time to meet the hard and fast deadlines of the national mandate? Should Congress build some flexibility into the program if inadequate transmission prevents compliance?

Answer. The scale of necessary infrastructure upgrades will depend on where the renewable generation is built. The time and expense of new transmission is a factor that should be considered in such decisions. For example, currently offshore wind is more expensive to build than onshore wind, but when the associated time and expense of transmission is considered, offshore wind becomes a more attractive investment. By creating an open national market for renewable generation credits and allowing for alternative compliance payments, I believe the majority staff draft builds in the necessary flexibility to deal with these and other complicating factors.

Question 4. Given the different goals and definitions of renewable energy in the various state renewable energy standard programs, how does the majority staff draft ensure consistency and coordination of the state and federal programs?

Answer. The majority staff draft sets the appropriate framework for coordinating state and federal programs. As I understand it, credits for state RPS requirements can be used to meet the federal obligation, as long as they are generated from a renewable resource that meets the federal definition of renewable energy. Some details about federal and state coordination remain to be worked out, but that should be addressed by subsequent regulations promulgated by the Department of Energy.

Question 5. Do you agree that any federal RPS program must account for the regional variations in the supply of renewable resources?

Answer. I believe the majority staff draft does account for regional variations in the supply of renewable resources by creating a national market for renewable energy credits, allowing states to purchase credits from the least cost renewable generation anywhere in the country. Each region has its relative strengths and weaknesses with regard to renewable resources, which will be reflected in the types of investments that are made in each region. Furthermore, each state remains free to enact policies to develop local renewable energy industries.

Question 6. I understand that in order to meet New Jersey's 22.5% RPS requirement by 2020, offshore wind would need to provide 48% of the renewable energy. According to reports, that means you need at least 1,000 megawatts generated by offshore wind turbines by 2012 and at least 3,000 megawatts by 2020. Given that we still have no offshore wind power production in this country—and this despite several years of effort on the Cape Wind proposal—such a scenario seems wildly optimistic. How do you respond?

Answer. Governor Corzine has set a goal of 1,000 MW of offshore wind by 2012 and 3,000 MW by 2020. The State is developing a series of policy initiatives to help New Jersey reach that goal. PSEG is currently developing a 350 MW offshore wind project that will be supported by these state policies. We believe that Governor Corzine's leadership on this issue, will allow us to overcome existing barriers to offshore wind and develop an industry that will create local jobs, improve air quality and reduce carbon emissions.

The state's offshore wind initiative will help New Jersey meet its RPS; however, offshore wind is not essential for New Jersey to meet its RPS targets because New Jersey's standard can be met with any renewable generation within PJM, our regional electric grid. Thus far, New Jersey has fully complied with its RPS through the development of renewable generation throughout PJM.

Question 7. How is the financial crisis impacting your company's planned renewable projects? I understand that PSEG anticipates cutting back its expected investments on some wind and solar projects.

Answer. What is the status of PSEG's Solar Initiative? In 2007, your company introduced a \$100-million plan to spur the investment of solar systems on homes, businesses, and municipal buildings. This program was to help you fulfill 50% of your RPS requirements for 2009 and 2010. Do any of these problems at the state level signal a need for greater flexibility in a federal program?

The financial crisis has forced every company to reevaluate its capital spending, and PSEG is no exception. However, we are moving ahead with the renewable energy projects we have previously announced, and New Jersey is continuing to meet its RPS requirements.

The renewable energy projects PSEG is pursuing include a 350-megawatt offshore wind farm. We are also continuing to implement our \$105 million solar loan program, which is poised to help finance over 11 MW of solar generation projects. And we recently announced a proposal for our utility to invest in nearly \$800 million of solar generation on government buildings, low-income housing, brownfields and utility poles. These investments are driven by our state RPS, and we believe such investments are particularly important during an economic downturn as they can create jobs and help stimulate our local economy.

Question 8. Would it be correct to say that your state regulators carefully analyzed the needs and available resources in New Jersey in the course of developing its RPS policy?

Answer. Our state RPS can be fulfilled with renewable generation located anywhere in PJM, our regional electric grid (with the exception of our solar carve out, which must be met with New Jersey-based generation). Therefore, in evaluating our state RPS, our regulators focused on evaluating the available renewable resources located throughout the PJM region.

Question 9. It is my understanding that the New Jersey 22.5% by 2020 RPS requirement is subdivided into different classes of eligible resources—Class I (solar,

wind, biomass, and a few others); Class II (small hydro and “resource recovery facilities”); and a requirement that solar comprise a certain percentage of the total.

Answer. New Jersey’s structure obviously differs from the majority staff draft. How do you believe the differences between the federal program and New Jersey’s program should be resolved?

I do not believe these differences need to be resolved because, as I understand it, the majority staff draft does not preempt states from pursuing their own state standards, which may include different definitions of renewable energy than the federal standard. This will add some complexity to efforts to coordinate state and federal programs, but I believe these issues can be resolved through the regulatory process as the Department of Energy develops rules for coordinating state programs.

Question 10. Is it fair to say that the adoption of a federal RPS will create investment opportunities for your company?

Answer. A federal RPS would create business opportunities for any company that wants to invest in renewable generation. In turn, this will create jobs and provide stimulus for our economy.

PSEG’s core businesses are an electric and gas distribution utility, a nuclear generation company and a fossil fuel generation company, which includes both coal and natural gas powered generation assets. We are beginning to grow both a regulated and unregulated renewable generation business, but these businesses are in the early stages of development. However, we see renewable energy as part of our long-term growth strategy.

Question 11. Is it correct that you believe nuclear energy is vital to a carbon-constrained future and that all options must remain on the table?

Answer. Yes. If we are to reduce carbon emissions 80% by 2050, we need to aggressively pursue energy efficiency, renewable energy and clean central station power, such as nuclear generation. I believe an RPS is the best policy to directly support renewable electric generation. Different policies should be used to support energy efficiency and clean central station power.

Question 12. In 2007, before the financial crisis, you were quoted in New Jersey Business as saying:

. . . we are asking people to sacrifice in exchange for the environmental benefits. For some customers, the choice might mean not buying the extra sail for the boat. For others, it might mean not being able to put that third meal on the table. Some people are more concerned about meeting today’s bills than being concerned about carbon dioxide levels 100 years from now.

I’m not concerned with the guy who can’t buy a new sail for his boat, but we’re all concerned with asking people already hard hit to choose between energy and putting meals on the table. Is this a fair choice?

Answer. PSEG serves the majority of New Jersey’s low-and moderate-income families, and I am concerned about their ability to pay for green investments. As I said in my testimony, in the long run investing in renewable energy will be a net benefit for customers, but in the short run it will be more expensive.

In the worst case scenario, by 2021 the majority staff draft would impose an additional three cents per kilowatt hour on 20% of our electricity, or an additional 0.6 cents on all of our electricity. Presuming we have 10 cent electricity that would mean an increase of roughly 6% in 2021, or approximately 0.5% per year. For most families this cost is manageable, but for families struggling to make ends meet it will be an added burden.

PSEG is a strong proponent of LIHEAP and state-based programs designed to help customers pay their energy bills, because no family should be forced to choose between heat and putting food on their table. We also strongly support energy efficiency programs targeted at low- and moderate-income families. Our utility is beginning to implement such programs in our urban areas to help families reduce their bills.

RESPONSE OF RALPH IZZO TO QUESTION FROM SENATOR LANDRIEU

Question 1. I know that we can achieve efficiency gains in both the interstate transmission of electricity as well as the retail distribution of electricity. In Sen. Bingaman’s draft language that has been circulated, it only allows for savings from the retail distribution of electricity. Don’t you think there are huge efficiency gains to be made through efficiency upgrades to our transmission backbone? Shouldn’t that also be included in any efficiency portion of a RES?

Answer. I agree that we could make efficiency improvements in both our transmission and distribution systems. I believe, however, that the RPS should be used

exclusively to promote renewable generation, and that other federal policies should be developed to incent investments in energy efficiency. Both are needed.

RESPONSES OF RALPH IZZO TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What are we trying to achieve through a Renewable Electricity Standard (RES)? What are the goals? By focusing solely on renewables, are we limiting our options to achieve an adequate supply of clean, low-carbon, reliable and affordable electricity?

Answer. I believe the goal of the RPS is to increase our use of renewable electric generation and to develop industries that will benefit our environment and economy for generations. And as we electrify our transportation sector, renewable electric generation will become critical to America's energy security.

To make the reductions in greenhouse gas emissions that scientists say are necessary to avert catastrophic impacts from climate change, we need a portfolio of policies. This should include a national carbon cap-and-trade system, adequate incentives for new nuclear generation, programs to promote energy efficiency, and a federal RPS that will drive demand for technologies that will transform the way we generate electricity.

Question 2. If the main concern surrounding RES is to have clean energy then we should consider nuclear power. Nuclear power is produced in the United States, it has zero carbon dioxide emissions, and it does not put stress on agriculture products or the timber industry. Why has this source not been considered in the RES discussion?

Answer. I agree that nuclear power has to be part of our climate change solution. However, nuclear power is not a renewable resource. Moreover, the challenges for building new nuclear are different than the challenges of growing renewable energy industries. Nuclear power requires a very large, up-front capital investment; it has a very long construction time; and it faces unique regulatory hurdles. We need federal support for new nuclear generation, but that support is not best delivered through an RPS.

Question 3. Why do you include energy sources that may yield some benefit in the future and do not have any short term benefits, but continue to exclude nuclear power that has both short term and long term benefits?

Answer. Please see the answer to question #2 above.

Question 4. The US consumes approximately 1000 gigawatts of electricity every year. The RES legislation would require approximately 200-220 gigawatts to come from renewable energy sources by 2020. What percentage of the renewable energy mandate will be supplied by wind and why does wind have a larger potential than other renewable sources such as hydro or nuclear?

Answer. It is difficult to predict with any accuracy the percentage of the RPS that will be fulfilled by any one generation technology. At this point, onshore wind is among the most cost-competitive renewable generation resources, so we would expect a significant percentage of the RPS to be met with onshore wind. However, as the RPS drives investment into renewable energy industries we could see significant improvements in the capacity factors and reductions in the production costs of other renewable energy technologies, making them more competitive.

Nuclear and hydro power constitute a far greater percentage of our current electric generating capacity than any of the other technologies eligible under the majority staff draft bill; however, there are unique challenges to expanding our reliance on either nuclear energy or hydro power. Therefore, it is difficult to compare the relative potential of nuclear power, hydro and onshore wind. But all forms of carbon-free electricity will be needed to reduce emissions 80% by 2050.

Question 5. In your opinion, how will the Southeast states meet their mandate requirements since wind is not a significant energy source in this region?

Answer. It is difficult to predict specifically how different states will comply with a federal RPS, particularly over the long term. As some of the maps that were entered into the record indicate, the southeastern states have considerable potential to develop biomass generation. In addition, state policies can drive investment in certain renewable technologies. For example, because of state policies, New Jersey is second in the nation to California in solar installations despite having relatively weak solar energy resources. To the extent that local renewable generation resources are not sufficient to meet the federal RPS, all states will be able to purchase the lowest cost renewable energy credits from anywhere in the country.

Question 6. How will a RES affect the price of electricity in Southeast states?

Answer. With the exception of states that are already paying for state RPS programs, the cost of complying with the RPS should be fairly equal in all regions of the country. This is because the majority staff draft sets up a national renewable

credit trading system, under which all states will have the opportunity to buy renewable credits from the least-cost renewable generation resources in the country.

RESPONSE OF RALPH IZZO TO QUESTION FROM SENATOR MENENDEZ

Question 1. Dr. Izzo, as you know New Jersey has a specific carve out for solar technology in its Renewable Portfolio Standard. You have testified that you do not believe there should be a carve out for a specific technology, such as solar, for a national Renewable Electricity Standard. I do not agree, but I can understand how one could think that a national standard should not single out one technology in this manner.

I am concerned, however, that the RES proposal before us would drive investment only for onshore wind. If we rely so heavily on one technology I believe that in a decade or so we would regret such a policy because the best land-based wind resources can only take us so far.

One way to ensure a wide variety of technologies are incentivized by a National Electricity Standard would be to include a reverse carve out. This would mean that no one technology could be used to fulfill more than a certain percentage of the RES. Such an approach could help spur distributed sources of generation, biomass, offshore wind, geothermal, and a host of other technologies. Would you support a reverse carve out in a national Renewable Electricity Standard?

Answer. Yes I would. As I said in my testimony, it is important that we use the RPS and other tools to support a range of technologies in our effort to decarbonize our electric generation. If we establish a strong, federal RPS, I believe it will create a flourishing national market for renewable generation, which I expect will drive investment toward a number of renewable technologies. However, a reverse carve out would be a sensible backstop to ensure that the RPS does not almost exclusively support a single technology.

RESPONSES OF RALPH IZZO TO QUESTIONS FROM SENATOR MARK UDALL

Question 1. Each region of the U.S. is blessed with excellent renewable resources. If wind power potential is not very good in the southeastern U.S., does that mean that utilities in that region of the country will be unable to provide their customers with electricity generated from renewable resources under a RES?

Answer. No. The majority staff draft would allow states to meet the RPS requirements either with the development of local renewable energy resources, or by purchasing renewable energy certificates generated anywhere else in the nation.

Question 2. During the Bush Administration, the Energy Information Administration analyzed several different national RES legislative proposals. In each case, EIA determined that biomass would receive the most RES credits of any renewable technology eligible to receive credits. Please identify which regions of the country have the greatest biomass potential.

Answer. Analysis by the National Renewable Energy Laboratory indicates that there are strong biomass resources in the West, Upper Midwest and Southeast, along with pockets of biomass potential in various other states throughout the country.

Question 3. If the U.S. were to generate up to 25% of its power from renewable resources, how would this impact our country's reliance on natural gas to generate electricity?

Answer. If the U.S. generated 25% of its electricity from renewable resources, that would reduce demand for electricity generated from traditional resources. Analysis from the Energy Information Administration shows that the decreased demand for traditional generation would reduce our demand for, and reliance on, natural gas.

Question 4. If the country switches to plug-in hybrids to power our automobiles and also adopts a 25% national RES, what would the impact be on oil and gas imports over the next 25 years?

Answer. Transitioning from gasoline-powered cars to electric cars is crucial for our long-term energy security and our efforts to reduce demand for foreign oil. But as we electrify our transportation sector, it will become increasingly important that we decarbonize our electric generation so that we can reduce our carbon emissions. If we can pursue these two goals in tandem, we will reduce oil imports, reduce demand for natural gas, reduce carbon emissions and increase our energy security.

RESPONSES OF LESTER B. LAVE TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. You argue that we should include nuclear power and coal with carbon sequestration in our standard. If we did so would we not have to make this standard

much higher in order to achieve within it the goals that we would hope for with those technologies?

Answer. You are correct. If an RES contained nuclear and CCS, it should be much larger than 20%. I favor including more "reduced carbon" technologies in the standard in order to allow greater flexibility for states that don't have one or another of the resources. The proposed legislation singles out several technologies as being the answer to social concerns including carbon-dioxide emissions, sustainability, air pollution emissions, energy security, and environmental quality more generally. Renewable do help meet some of these concerns, but they are not the only technologies for doing this and, in many cases, are neither the most effective way of reducing carbon-dioxide emissions nor the least cost way of providing the electricity.

While I believe that renewables will become an essential part of the way of attaining these goals, along with energy efficiency, one clear lesson from the 1970s is that the market place, not Congress or the Department of Energy, should choose the winning technologies. Congress and DOE must make decisions about R&D, but this is quite different from mandating that a technology be deployed.

While I am concern about energy security, general environmental quality, and sustainability, these are not large problems for electricity generation at this time. Congress and EPA have firm control of general environmental quality; I see no need to press for renewables to improve general environmental quality. Sustainability is not the highest priority now, since we have adequate uranium and coal resources. Natural gas could become a sustainability concern, if the shales do not produce as much natural gas as some project. Thus, my primary concern for electricity generation is carbon-dioxide emissions.

I support and urge Congress and DOE to adequately fund basic research on photovoltaic technology and battery technologies. Both are key to our future, but neither is sufficiently developed for commercial success in baseload generation (photovoltaic) or applications such as plug-in hybrid vehicles or electric vehicles.

Question 2. If you acknowledge that the main obstacles to nuclear power are lack of a solution to the waste problem, concerns over proliferation of nuclear weapons, and costs, what is it that the RES does to resolve those difficulties?

Answer. All technologies for producing electricity have difficulties. Through regulation we need to handle these problems, whether they be proliferation, spent nuclear fuel, or greenhouse gases. I am optimistic that we can, save possible for proliferation. If we cannot prevent nations wanting nuclear weapons from getting them from a nuclear reactor program, we have to ask whether we could stop them from getting nuclear reactors. I do not think that we can. Thus, while I am concerned about proliferation, I do not see that there is much that we can do about it. President Carter stopped fuel reprocessing in order to present a model to other nations. Perhaps that worked for a time, but is not working now.

The largest issue is going to be competition among the technologies for generating electricity. If nuclear power plants are cheapest for some regions, there is little that we will be able to do to stop other nations for building them.

Question 3. If you expand the RES to push the development of sufficient nuclear power, and the problems currently preventing nuclear plant development are not resolved would not you then have an unworkable RES?

Answer. If, as you suggest in question 1, we included nuclear and efficiency in the RPS and expanded its scope, and if nuclear proved to be non competitive, there would be greater difficulty in meeting the RPS. However, that would be the real world. If we are to lower greenhouse gas emissions, we need to find a combination of generation and efficiency that does not. Nuclear should be helpful, but if it isn't, we still need to lower greenhouse gas emissions.

Question 4. If you don't expand the RES but include nuclear power and those problems are resolved, would this standard result in anything other than what was going to happen anyway? Would more new renewables be built?

Answer. This question amplifies the previous two questions. The low carbon technologies should compete. If nuclear is the cheapest, it should dominate. The price of electricity is important for both consumers and business. If renewables are competitive, they will be deployed. If not, I am not clear why we ought to mandate their deployment.

I want to qualify that statement in the sense that I want a portfolio of generation technologies. Fuel prices and environmental concerns change over time and so it is prudent to have a portfolio of generation technologies, even if one appears to be cheapest at this time.

RESPONSES OF LESTER B. LAVE TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. How much back up power from conventional power plants is needed to meet a 20% RPS requirement by 2021? At what cost?

Answer. There would be almost no reduction in the need for backup capacity (dispatchable capacity) if there were a 20% RPS. The amount of generation capacity needed depends on the peak demand (with a margin for safety). Renewables would lower the amount of fossil, hydro, and nuclear generation capacity needed only insofar as they could be depended upon to generate power during the peak hours of the year. In most areas of the USA, peak demand occurs between 5 and 6 PM on the hottest summer day. That is generally a time when there is little wind. Although solar energy is high on those days, the sun is low enough to the horizon by 5 PM that it is generating little electricity.

Solar thermal arrays might be constructed to provide some generation during these periods by storing heat. Alternatively, if there were cheap bulk storage of electricity, wind and photovoltaic electricity could be stored for peak demand. However, with current technology, wind and solar would relieve little of the need for "dispatchable" capacity, capacity that the utility can depend upon to be available when they need it.

A 20% RES would reduce the amount of fuel (coal or natural gas) required to generate electricity. However, since a gas turbine is generally used to fill in the momentary drop-offs in wind or solar generation, the fuel saved would be much less than 20%. Thus, there would be almost no savings in total investment in dispatchable plants and less than a proportional savings in fuel costs. Getting a realistic estimate of the cost of wind energy requires including the cost of backup or storage.

Since wind farms and solar arrays have low capacity factors (10-40% for wind and 10-20% for solar), it would take 2.25 to 9 units of wind capacity to replace on unit of nuclear capacity and 4.5 to 9 units of solar capacity to replace on unit of nuclear capacity. For example, a solar array in New Jersey with a capacity factor of 10% would have to have nine times the capacity of a nuclear reactor to produce the same amount of electricity. A wind farm with a capacity factor of 30% would have to have three times the capacity of the nuclear reactor to produce the same amount of electricity. Thus, a 1,000 MW nuclear reactor produces as much electricity as 9,000 MW of solar cells in New Jersey or 3,000 MW of wind farms in Pennsylvania.

Question 2. Do you agree that as it now stands, our country's transmission infrastructure is woefully inadequate to achieve a 20% by 2021 RPS requirement?

Answer. Yes. The vast majority of the current transmission grid was built to transfer energy from the generators owned by a utility to its customers. Some transmission was built to interconnect utilities. Since restructuring began in 1998, there has been little investment in transmission in restructured areas. Thus, the grid is not designed to get renewable energy from the best wind and solar sites to population centers. Massive investment in transmission would be needed to implement a 20% RES.

Question 3. What are the estimated infrastructure costs to meet the legislation's requirement? How realistic is it to get the necessary transmission in place in time to meet the hard and fast deadlines of the national mandate? Should Congress build some flexibility into the program if inadequate transmission prevents compliance?

Answer. The National Academy of Sciences "America's Energy Future" study deals with this question and should be available within two months. I have seen estimated costs for a modern grid that could accommodate renewables that exceed \$200 billion. A doctoral dissertation done a few years ago at Carnegie Mellon documented the difficulties in siting new transmission lines. Particularly in densely populated areas, there are formidable difficulties since few people want a transmission line on their property or close by. In the 2005 or 2007 energy legislation, Congress authorized the Secretary of Energy to designate national transmission corridors. I do not think that this designation has been terribly helpful in overcoming the objections to siting new transmission lines. There is considerable doubt that new lines can be sited to transmit the electricity to population centers. For example, Texas' requirement for renewables resulted in large investments in wind farms in the west, but it took some years to build the transmission to bring the electricity to market.

Question 4. Given the different goals and definitions of renewable energy in the various state renewable energy standard programs, how does the majority staff draft ensure consistency and coordination of the state and federal programs?

Answer. There is a vast, inconsistent array of definitions of renewable power among the states. For example, Pennsylvania includes electricity generated from waste coal piles. Some states have a solar set aside. Some states include methane from landfills. There is no uniformity across states; I don't see a possibility for co-

ordination. A federal standard could set a minimum requirement that states could be free to supplement.

My understanding is that the usual justification given for federal legislation overriding what states consider their prerogative is interstate commerce. However, Texas has essentially isolated its electricity grid from much of the nation and so there is little interstate commerce for electricity between Texas and the rest of the nation.

Question 5. Do you agree that any federal RPS program must account for the regional variations in the supply of renewable resources?

Answer. Renewable resources are not uniformly spread across the USA. The Northern Great Plains have the best wind resources, the desert Southwest has the best solar resources and the West has the best geothermal. The West generally has poor biomass resources because of low rainfall. A national RES would be punitively expensive if it doesn't allow a great deal of flexibility in how to meet the standard.

I favor a carbon portfolio standard that would focus on the most important issue for electricity generation. I would include efficiency in that standard to give a region such as the Southeast with poor wind and solar resources an inexpensive way to comply. For example, California and New York State both use 40% less electricity per capita than the national average. They have achieved this efficiency with major expenditures and programs. If the Southeast could lower its electricity use by 40%, they would achieve more than twice the carbon-dioxide emissions reduction of a 20% RES.

Question 6. Instead of a Renewable Portfolio Standard, you advocate the creation of a Carbon Portfolio Standard (CPS). How would something like that work? How would you treat energy efficiency under a CPS?

Answer. I do favor a carbon portfolio standard. California has already created a model for this. They allow no more than a specified amount of carbon-dioxide to be emitted per megawatt-hour of generation. The standard can be met by renewables, by nuclear, or by fossil fuels with CCS. I would also allow the standard to be met by increased energy efficiency. That could be done by setting a standard for carbon-dioxide emissions due to electricity use per capita. Assume that the CPS called for a reduction of 40% of carbon-dioxide emissions. For a state that uses 30,000 kWh of electricity per capita per year, they could meet the standard by lowering carbon-dioxide in electricity generation or by lowering electricity use. For example, the state could lower electricity use by 20% to 24,000 kWh per capita and lower carbon-dioxide emissions per kWh by 20% in order to meet the standard.

Question 7. How are the states doing in implementing their own RPS requirements? I understand that Massachusetts is behind, in part because the proposed wind farm off Cape Cod has yet to be built—and it's been under review for the past several years.

Are the long-distance transmission lines needed to deliver the power, to meet the state requirements, being built?

Answer. Massachusetts has been unable to meet its RPS until this year. Utilities were forced to buy renewable energy credits for about 6 cents per kWh for their shortfall. States such as California and New York have set extremely ambitious RPS and it is far from certain that they will be able to attain them. Difficulties in siting wind farms and transmission lines have slowed the introduction of renewables.

There has been little investment in transmission in the deregulated states.

Question 8. Can you explain the problems with integrating intermittent renewable resources into the grid? It was just last February that the Texas grid was forced to shed load when the wind stopped blowing, dropping from 2000 MW to 350 MW just as demand peaked. What kind of investments in transmission and storage do we need to make to ensure the reliability of renewable power?

Answer. Both wind and solar resources are variable, meaning that the generation varies from minute to minute. To keep power quality high, investments are needed to fill in the generation gaps. For very short term variation, batteries, flywheels, and capacitors can be used. For variation that occurs over hours, generally gas turbines (or hydropower where available) are used. Prediction of wind and clouds has gotten better, but are far from perfect. There are recent experiences in Texas and Hawaii when unpredicted drop-offs in wind resulted in near blackouts because alternative generation could not be ramped up fast enough.

The variation in wind and solar can be dampened by hooking in wind farms and solar arrays from distant sites. However, this is only a partial solution; a study done by GE for Texas found five days during April when there was essentially no wind energy available in Texas.

To supply reliable, high quality power, the wind and solar generation must be backed up with a variety of quick acting and longer lasting instruments. For example, batteries, flywheels, and capacitors can be used to correct minute to minute

variable while hydro or gas turned can be used to fill in generation shortfalls that are hours in duration.

I cannot estimate the required investment in transmission, apart from the estimate of more than \$200 billion. The investment to overcome the minute to minute variability is about 1 cent per kWh.

Question 9. In your opinion, should Congress be trying to pick technology “winners and losers” with a national RPS? How can we best accommodate future technological innovation?

Answer. No. An important lesson from the 1970s is that government needs to decide which technologies to spend R&D money on, but should not pick which technologies should be implemented. Engineers and entrepreneurs should make that decision. I am a technological optimist and believe that better technologies will emerge over the next decade or so. Our research monies should support the development of these new technologies, but they should have to compete with other technologies for implementation.

Question 10. Proponents of a national RPS insist the Southeast can meet the mandate through the use of biomass. Do you agree? Is this the best use for biomass, with its land limitations, or is this resource better used in transportation fuels?

Answer. The Southeast has abundant biomass resources. There might be sufficient biomass to meet a 20% RPS. However, in a world with stringent greenhouse gas emissions constraints, we know how to produce electricity with little or no carbon emissions through hydro, nuclear, wind, solar, and fossil fuels with CCS. Producing liquid fuels for cars, aircraft, and ships is a much more difficult problem. Liquid fuels without carbon-dioxide emissions can be produced from biomass. In a carbon constrained world, we would want to devote biomass to producing liquid fuels, not to generating electricity.

RESPONSE OF LESTER B. LAVE TO QUESTION FROM SENATOR LANDRIEU

Question 1. I know that we can achieve efficiency gains in both the interstate transmission of electricity as well as the retail distribution of electricity. In Sen. Bingaman’s draft language that has been circulated, it only allows for savings from the retail distribution of electricity. Don’t you think there are huge efficiency gains to be made through efficiency upgrades to our transmission backbone? Shouldn’t that also be included in any efficiency portion of a RES?

Answer. The usual estimate is that about 2% of electricity is lost in transmission and 8% in distribution. However, current transmission lines are relatively short. If we attempted to transmit power over long distances with today’s relatively low voltage alternating current lines, transmission losses would be much greater. If we need to construct transmission to take wind from North Dakota to Florida, the cheapest, most efficient way to transmit electricity over long distances is with high voltage direct current lines. Building an infrastructure with HVDC lines would be expensive and time consuming because of siting objections. There would be substantial electricity lost even for these lines due to the distance.

RESPONSES OF LESTER B. LAVE TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What are we trying to achieve through a Renewable Electricity Standard (RES)? What are the goals? By focusing solely on renewables, are we limiting our options to achieve an adequate supply of clean, low-carbon, reliable and affordable electricity?

Answer. People have different goals for an RES. The national interest would be served by lowering carbon-dioxide emissions, increasing environmental quality more generally, increasing sustainability and energy security, and by keeping electricity prices low enough not to have inordinate economic and personal penalties. Some people want an RES because they want to sell equipment that they make. Others support an RPS because they think they already know which technology is best at attaining these goals. I agree with the social objectives and think that equipment makers have the right to try to persuade people to buy their products. I do not see how someone could know what is the best technology to attain the social objectives at such an early stage of development of the technologies.

Rather than focusing on a RES, I favor a carbon portfolio standard that includes energy efficiency. In my judgment, this approach would allow us to attain our social goals at least cost and with the least disruption.

Question 2. If the main concern surrounding RES is to have clean energy then we should consider nuclear power. Nuclear power is produced in the United States, it has zero carbon dioxide emissions, and it does not put stress on agriculture products or the timber industry. Why has this source not been considered in the RES discussion?

Answer. Senator, I agree that all sources of low carbon energy should be considered and allowed to compete. I do not know why nuclear has not been considered.

Question 3. Why do you include energy sources that may yield some benefit in the future and do not have any short term benefits, but continue to exclude nuclear power that has both short term and long term benefits?

Answer. Senator, respectfully, I would like nuclear to be able to compete to provide low carbon power to the nation.

Question 4. The US consumes approximately 1000 gigawatts of electricity every year. The RES legislation would require approximately 200-220 gigawatts to come from renewable energy sources by 2020. What percentage of the renewable energy mandate will be supplied by wind and why does wind have a larger potential than other renewable sources such as hydro or nuclear?

Answer. Sir, the US electricity industry produced 4.1 million gigawatt-hours in 2006. A federal RPS would require up to 0.8 million gigawatt-hours from renewables, if there were no efficiency gains. At this time, wind turbines in good wind locations are the least expensive way to generate a significant amount of additional renewable electricity. During the 20th century, we built a tremendous amount of hydroelectric capacity by damming major rivers. Few good locations remain to be exploited. Flooding large amounts of land behind high dams has major environmental impacts, as well as impeding fish migration. At this time, the nation is not building new major hydroelectric projects, but rather is breaching some dams. There are some "run of the river" hydro that could be developed and some "low-head" hydro on small rivers and streams, but the total amount of electricity that could be generated is relatively small. Geothermal generation, where there are good resources, can compete with wind. In some locations, solar thermal is almost competitive. Solar photovoltaic is much more expensive than current generation. Nuclear has vast potential for power generation, but the cost of power from new nuclear reactors is uncertain until we construct new plants.

Thus, wind turbines in good locations offer the lowest cost electricity; there are much greater wind resources than other renewables, except solar. Thus, major development of renewable resources has focused on wind.

Question 5. In your opinion, how will the Southeast states meet their mandate requirements since wind is not a significant energy source in this region?

Answer. The Southeast could meet an RES in three ways. It could use biomass in the form of trees, it could import wind energy from good locations, or it could buy renewable energy credits from areas that can more than meet the RES. Biomass is probably the cheapest alternative, unless the biomass is wanted for producing transportation fuels. Building long transmission lines will greatly increase the cost of delivered power. For example, we estimated that a 1,000 mile transmission line would double the delivered cost of power. Buying renewable energy credits would be limited by the ability of areas with good wind resources to absorb wind energy. For example, North Dakota has perhaps the best wind resources in the nation. However, there is very limited ability to absorb large amounts of wind generated electricity locally. As a practical matter, if more than 15-20% of electricity is provided by wind, there would have to be major investment to buffer the variability of wind and to ramp up quickly when wind speeds dropped.

There is a fourth alternative: Develop wind and solar generation where the resource is extremely limited. This would result in very costly power.

Question 6. How will a RES affect the price of electricity in Southeast states?

Answer. If biomass is available to meet the RES, electricity generation costs might rise by perhaps 25-50%. If long transmission lines are built, the wholesale price of electricity in the Southeast is likely to double or more. If they are able to buy renewable energy credits, electricity prices will rise by 3 cents per kWh.

RESPONSES OF LESTER B. LAVE TO QUESTIONS FROM SENATOR CORKER

Question 1. I was interested in the testimony you provided regarding biomass and the Renewable Fuel Standard. Could you discuss why you believe biomass is best suited for transportation fuel and not for an RES? Do you have any sense of what the available biomass resources are in the Southeast and approximately how much of those resources would be used for the RFS? If there are not enough biomass resources in the Southeast to meet the demands of both the RFS and RES, would an RES essentially force the Southeast to direct this renewable resource to the less efficient "market" or would the available biomass be used for the RFS, forcing the Southeast to comply with an RES through the purchase of credits or alternative compliance payments?

Answer. Biomass could be used either for electricity generation or production of liquid transportation fuels. Since there are a variety of technologies for producing

electricity with little or no carbon-dioxide emissions, biomass would not be terribly important for this use. In contrast, ethanol is the best source of liquid fuel for transportation without net carbon-dioxide emissions, assuming the ethanol comes from biomass, not corn. Thus, if large reductions in carbon-dioxide emissions are required, biomass would be used to produce ethanol, not electricity.

If the Southeast were required to satisfy a 20% RPS and biomass was the cheapest way of doing it, biomass would be diverted from a higher use.

The National Academy of Sciences "America's Energy Future" report will present the best estimates of biomass resources. Until then, a study from many of the National Labs estimates that 500-1,000 million tons of biomass could be available for transformation into electricity or liquid fuels. The study gives details on the state by state biomass availability.

Question 2. A federal RPS would dramatically increase wood demand and, as a consequence, increase prices on the forest products industry which relies upon affordable and reliable wood fiber. During these difficult economic times, such price increases would threaten good jobs in this industry, particularly in rural America. Is it true that a federal RES, as currently constructed, would drive up wood fiber costs and directly lead to job loss in the forest products industry?

Answer. I am not an expert on the variety of jobs in the forest products industry. If the trees are being cut for fuel to generate electricity, there would be fewer jobs than if the trees are converted into liquid fuels. I conjecture that large scale tree farming with conversion of the biomass into liquid fuels would generate many jobs and substantial income in the Southeast.

RESPONSES OF LESTER B. LAVE TO QUESTIONS FROM SENATOR MARK UDALL

Question 1. Each region of the U.S. is blessed with excellent renewable resources. If wind power potential is not very good in the southeastern U.S., does that mean that utilities in that region of the country will be unable to provide their customers with electricity generated from renewable resources under a RES?

Answer. The draft legislation allows a state to meet the federal RPS by buying renewable energy from another state or by buying renewable energy credits. If states in the Southeast found it too expensive to generate renewable electricity within their state, they could meet the requirement in the other two ways. The likely implication is that these states would have higher electricity prices than states with good wind resources.

I would like to see greater flexibility in the legislation. I would tighten the definition of efficiency and remove, or at least lessen the cap. I would include all low or no-carbon generation in the definition. Of course, I would then raise the standard that each state would have to attain, given this more flexible definition.

My point is that society needs to be clear on the goals that the legislation is seeking to achieve. In my judgment, reducing carbon-dioxide emissions and preserving reasonable low costs are the two most important goals. We have sufficient coal and uranium so that sustainability is not a first order concern. Energy security is not currently a first order concern since only 2% of electricity is generation from petroleum and we import substantial amounts of natural gas only from Canada. Congress and EPA should monitor environmental quality carefully and enact whatever legislation and standards are needed to ensure high environmental quality, particularly if we are mining and burning greater quantities of coal. For these reasons, I urge you to focus this legislation on the goals of lowering carbon dioxide emissions at a reasonable cost.

Question 2. During the Bush Administration, the Energy Information Administration analyzed several different national RES legislative proposals. In each case, EIA determined that biomass would receive the most RES credits of any renewable technology eligible to receive credits. Please identify which regions of the country have the greatest biomass potential.

Answer. The National Academy of Sciences "America's Energy Future" studies will present good estimates of biomass potential. Until the report is available, there is a report on biomass potential by a consortium of National labs.

RESPONSES OF DON FURMAN TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. In your experience, are the multiple state standards able to produce a credit trading market that can generate a reasonably consistent national value for renewables credits?

Answer. No. While there is a loose market of traded renewable credits, it is illiquid and highly inefficient. Each state defines renewable energy differently. In addition, certain states prohibit the use of RECs associated with renewable energy

generated in other states to be used for compliance purposes, or place a different value on out-of-state RECs and in-state RECs. A consistent definition of eligible renewable energy and a nationwide trading platform—both of which would be achieved with the enactment of your RPS bill—is needed if we are going to be able to reap the full benefits of REC trading.

Question 2. In our proposal we allow states implement their own standards that are stronger than the federal standard and to regulate what their utilities can do as far as selling excess federal credits, while not compelling them either to allow the sale or to disallow it. Does this, in your view, result in more renewables built and generated?

Answer. Yes. The Bingaman RPS proposal would establish a national renewable energy floor but allow states to exceed that floor if they so choose. This will lead to greater amounts of renewable energy than if the Bingaman proposal preempted state opportunities to promote renewable energy. In addition, if a state that chooses to require its utilities to exceed the national requirement also requires those utilities to “retire” RECs that the utility won’t need to comply with the national RPS instead of selling those credits to other utilities, this will lead to a greater amount of renewable generation because additional RECs will be required for national RPS compliance.

RESPONSES OF DON FURMAN TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. How much back up power from conventional power plants is needed to meet a 20% RPS requirement by 2021? At what cost?

Answer. Because the issuance of renewable energy credits under the Bingaman RPS proposal is dependent on the generation of renewable electricity, no back up power from non-renewable power plants will be necessary to meet the RPS requirement.

Some opponents of renewable energy argue that, for every installation of wind or solar power, utilities will need to build an equal amount of thermal power plants (generally fueled with natural gas) to provide power when the wind isn’t blowing or the sun isn’t shining. This is a dramatic overstatement. We will need to build some additional thermal generation, as well as transmission, in order to accommodate a higher percentage of intermittent generation. However, the additional thermal generation required to support a given amount of wind or solar is a small fraction. This issue becomes less significant depending on the size of a particular utility control area. The broader the control area, the easier it is for utilities to manage plant outages without additional generating capacity. Equally important, with or without an RPS, utilities will need to build and acquire reserve generation capacity to address situations where conventional and non-conventional generation facilities are temporarily unavailable.

Question 2. Do you agree that as it now stands, our country’s transmission infrastructure is woefully inadequate to achieve a 20% by 2021 RPS requirement?

Answer. Our country’s transmission structure is inadequate with or without the enactment of a national RPS. NERC has on numerous occasions noted that substantial additions to transmission capacity are necessary if we are going to maintain the reliability of the grid. The additional investments needed to restore reliability will also allow utilities to manage intermittent generation, such as wind and solar, at much lower costs. Also, one of the benefits of an expanded grid is the ability to access some of the best renewable energy resources which are often located in remote regions of the country, some distance from load. Enhancing our transmission infrastructure would help lower the cost of compliance of a national RPS.

Question 3. What are the estimated infrastructure costs to meet the legislation’s requirement? How realistic is it to get the necessary transmission in place in time to meet the hard and fast deadlines of the national mandate? Should Congress build some flexibility into the program if inadequate transmission prevents compliance?

Answer. It is not possible to provide an estimate of the investment in transmission infrastructure that would be necessary to meet the RPS’ requirement because there is no particular level of transmission infrastructure that would be required to meet the RPS. The same response applies to the request for the time deadline for having the transmission infrastructure in place. Additional transmission infrastructure will help reduce the compliance costs of the RPS but utilities will not necessarily be left without compliance options if transmission is not built. The Bingaman proposal already provides flexibility to utilities by enabling them to make an alternative compliance payment if they aren’t able to generate/acquire renewable energy or renewable energy credits that are more cost effective.

Question 4. Given the different goals and definitions of renewable energy in the various state renewable energy standard programs, how does the majority staff draft ensure consistency and coordination of the state and federal programs?

Answer. The Bingaman proposal would require the Secretary of Energy to, the maximum extent practicable, facilitate coordination between the Federal RPS program and state RPS programs. The lack of consistency between state RPS programs is one of the reasons we need a Federal RPS to ensure a consistent national approach but would also allow states to impose additional requirements on their utilities.

Question 5. Do you agree that any federal RPS program must account for the regional variations in the supply of renewable resources?

Answer. As long as the definition of “renewable energy” is as broad as it is in Senator Bingaman’s RPS proposal, each region of the country would be able to comply with a national RPS. Some opponents of a national RPS have attempted to portray the Southeastern United States as being disadvantaged because wind resources in the Southeast are not optimal. Nothing could be further from the truth. As the Energy Information Administration has repeatedly found, biomass, not wind, would generate the most renewable energy credits under a RPS and the Southeast has substantial biomass resources and also has a reasonable amount of solar power potential.

Question 6. Wind energy had a record year last year, installing over 8,300 megawatts of new generating capacity on line and bringing domestic wind capacity to 25,000 megawatts. Given the various federal incentives we provide for the wind industry, from R&D funding, the Production Tax Credit, the CREBS program, and the new loan guarantee program created in the stimulus package, to name just a few, why does the wind industry need a federal Renewable Portfolio Standard?

Answer. To date, the Federal government has chosen to incent renewable electricity production primarily through the tax code. Although the renewable production tax credit (PTC) has been successful it has also produced a great amount of uncertainty because the PTC has never been extended on a long-term basis. As a result, U.S. investment in manufacturing capability has fallen far behind the rest of the world, and at least half the equipment installed is manufactured overseas. The recent collapse of the tax equity market—which many renewable energy developers had utilized to monetize the PTC—has added even more uncertainty. Renewable energy developers need a more stable public policy approach. The RPS provides more long-term certainty by establishing a market for renewable energy over a reasonable period of time. It will also provide the certainty to cause investors to build manufacturing facilities in the U.S., employing Americans and saving consumers money.

Question 7a. You highlight last year’s Department of Energy report that determined wind could produce up to 20% of the nation’s power by 2030. The DOE report found that in order to reach a 20% level, we would need 300,000 megawatts of wind generation—an 1100% increase in wind power capacity. How much of this would have to be off-shore wind since, as you know, we still don’t have any off-shore wind in this country?

Answer. The continental U.S. has more than enough potential to meet the 300 GW target for wind energy which the DOE has estimated to be feasible. Off-shore wind could play a role, but it is not necessary.

Question 7b. Is the lack of adequate transmission another impediment? How much transmission would we need to accommodate a 20% level of wind power?

Answer. The lack of sufficient transmission capacity was one of the barriers identified in the DOE report. According to DOE, \$60 billion in transmission will be needed to satisfy the 20% target. If this investment is made, many regions of the country would gain access to less expensive renewable and non-renewable generation. It is also important to point out that much of the \$60 billion investment needs to be made anyway, to increase reliability and reduce congestion. Both transmission congestion and reliability concerns cost the economy billions of dollars per year.

Question 7c. A new study undertaken by MISO, PJM, SPP, the SERC Reliability Region, and TVA found that in order to get 20% of our nation’s electricity by 2024, we would need to upgrade our transmission system at a cost of \$100 billion, and the wind turbines needed to generate that power would cost almost \$720 billion. Do you agree with this assessment? If not, why not?

Answer. I haven’t yet reviewed the entire study. However, I understand the study concluded that this investment would save consumers in the Eastern U.S. approximately \$12 billion per year. As I noted earlier, investments in transmission infrastructure offer consumers significant benefits that need to be taken into account when assessment whether such investments should be made.

Question 8. You testified that a national RPS will provide a direct signal to the market place that will drive renewable energy development and eventually obviate the need for the Production Tax Credit. At what point do you see that happening? If we adopt a national Renewable Portfolio Standard, do we really need to continue the PTC? Shouldn't it be one or the other?

Answer. If a national RPS is enacted and it is robust enough to encourage investment in new renewable energy generating capacity, I believe it would be appropriate to phase-out the PTC. Given that each national RPS that has been proposed contains a ramp-up mechanism, it will be important to ensure that the national renewable target has ramped-up sufficiently to incent enough demand in renewable energy to negate further need for the PTC.

Question 9. I understand from your testimony that you do not support the inclusion of energy efficiency as a potential resource to meet even a small portion of the RPS standard. Rather than set a completely separate energy efficiency standard, as you propose, isn't there a way to make energy efficiency work in the context of an RPS?

Answer. It is very easy to determine when a kwh of renewable energy has been generated. However, it is much more difficult to calculate when a specific action has reduced a kwh of energy demand. That is why, although I believe energy efficiency should be strongly encouraged and should be our nation's highest priority, a portfolio standard approach is not the best public policy approach for achieving energy efficiency. I am concerned that the energy efficiency provisions contained in the Bingaman bill could reward credits that don't actually achieve specific energy savings.

Question 10. As drafted, Chairman Bingaman's draft provides for some exemptions such as those utilities with retail sales of less than 4 million megawatt-hours and taking hydropower out of the baseline calculation. What don't you support these exemptions? With regard to hydropower, are you actually advocating the displacement of this clean, renewable, base load generation?

I don't support or oppose these exemptions. I simply noted in my testimony that, if these exemptions are included, it is important that the RPS standard be set higher to take into account the reductions in renewable energy generation due to these exemptions.

Question 11. In your written testimony, you contend that our electric generating sector has become "dangerously reliant" on natural gas and that domestic supply is "unlikely" to keep pace with demand. But the facts seem to tell another story. We used natural gas to generate just over 20% of our electricity last year. Roughly 85% of that gas was produced here in the United States, and about 98% was produced in North America.

It also appears that we have more than enough natural gas to facilitate the generation you mentioned. EIA recently announced the largest-ever increase in its estimate of domestic reserves. Looking forward, EIA has projected that consumption will increase by an average of 0.2% per year through 2030—with imports accounting for just 3% of total consumption that year. And, a significant boost in supply is expected to come from my home state, Alaska, which is making progress on a natural gas pipeline that will transport 4 billion cubic feet per day.

Can you explain then, why you see natural gas as an unacceptable resource for electric generation?

Answer. I don't view natural gas as an unacceptable resource for electric generation. In fact, Iberdrola Renewables owns several gas-fired electric generation facilities. I also believe that natural gas will be a critical component of our energy supply going forward. I am concerned, however, with our growing reliance on natural gas-fired capacity and with a return to the trend of the 1990s where virtually all new electric generation was natural gas-fired.

The demand for natural gas in the electric generation sector has increased by approximately 62 percent over the last 14 years. Outside of wind, almost all of the new generating capacity built over the last several years is powered by natural gas and that trend is expected to continue into the future—especially if Congress restricts greenhouse gas emissions without adopting additional policies aimed at increasing renewable generation.

It may very well be that new domestic sources of natural gas, including those located in Alaska will help limit natural gas imports. However, we also could experience a significant increase in the demand for gas in the transportation, electric generation, industrial, agriculture and home heating sectors. It is important to remember that EIA's forecast does not assume the imposition of restrictions on greenhouse gas emissions.

Finally, I think it is important to note that T. Boone Pickens believes we need to substantially reduce the use of natural gas in the electric generation sector in

order to enable the increased use of gas for transportation in order to reduce our reliance on foreign imports of oil.

RESPONSE OF DON FURMAN TO QUESTION FROM SENATOR LANDRIEU

Question 1. I know that we can achieve efficiency gains in both the interstate transmission of electricity as well as the retail distribution of electricity. In Sen. Bingaman's draft language that has been circulated, it only allows for savings from the retail distribution of electricity. Don't you think there are huge efficiency gains to be made through efficiency upgrades to our transmission backbone? Shouldn't that also be included in any efficiency portion of a RES?

Answer. We can and should make improvements to the transmission grid that result in fewer losses associated with the transportation of electricity. The Federal government should certainly encourage these improvements. The Bingaman RPS proposal rewards efficiency in the distribution of electricity but not necessarily the interstate transmission of electricity. If there is going to be an energy efficiency standard, it might be appropriate to include transmission efficiency. However, as I noted in my testimony, I don't support the inclusion of an efficiency component in a national RPS because it is too difficult to actually measure energy savings attributable to specific actions.

RESPONSES OF DON FURMAN TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What are we trying to achieve through a Renewable Electricity Standard (RES)? What are the goals? By focusing solely on renewables, are we limiting our options to achieve an adequate supply of clean, low-carbon, reliable and affordable electricity?

Answer. The national RPS should be designed to encourage the development of a domestic renewable energy industry. This will enable the renewable energy industry to make a major contribution to our national economy, energy security and our goals of reducing greenhouse gas emissions. However, other policies will also be necessary to reduce greenhouse gas emissions. We often hear from opponents of a national RPS that nuclear power should be eligible for credits. However, it is highly unlikely, given how long it will be before we see the next generation of nuclear power plants placed in service, that new nuclear power facilities can be a major contributor to our generation portfolio in the near term. That is why we aren't seeing the nuclear industry push for the inclusion of nuclear in a RPS.

Question 2. If the main concern surrounding RES is to have clean energy then we should consider nuclear power. Nuclear power is produced in the United States, it has zero carbon dioxide emissions, and it does not put stress on agriculture products or the timber industry. Why has this source not been considered in the RES discussion?

Answer. See response to Question 1.

Question 3. Why do you include energy sources that may yield some benefit in the future and do not have any short term benefits, but continue to exclude nuclear power that has both short term and long term benefits?

Answer. See response to Question 1.

Question 4. The US consumes approximately 1000 gigawatts of electricity every year. The RES legislation would require approximately 200-220 gigawatts to come from renewable energy sources by 2020. What percentage of the renewable energy mandate will be supplied by wind and why does wind have a larger potential than other renewable sources such as hydro or nuclear?

Answer. The Energy Information Administration, in analyzing previous RPS proposals, has consistently concluded that biomass will provide more renewable energy generation than wind in order to meet a national RPS requirement. Incremental hydropower capacity would be eligible to be used for RPS compliance but most experts don't anticipate a significant amount of incremental hydropower potential.

Question 5. In your opinion, how will the Southeast states meet their mandate requirements since wind is not a significant energy source in this region?

Answer. The Energy Information Administration has determined that utilities in the Southeastern U.S. would have access to significant amounts of biomass energy as well as the ability to import wind power generated in nearby states in order to meet a national RPS requirement.

Question 6. How will a RES affect the price of electricity in Southeast states?

Answer. According to the Union of Concerned Scientists, consumers in the southeast will experience a reduction in their energy bills of \$94 billion if Congress adopts Congressman Markey's 25% by 2025 national RPS. The reason for this reduction is that a national RPS will reduce the demand for natural gas for electric

generation which will reduce both electric generation prices and the price of natural gas used for home heating and cooking.

RESPONSES OF DON FURMAN TO QUESTIONS FROM SENATOR MARK UDALL

Question 1. Each region of the U.S. is blessed with excellent renewable resources. If wind power potential is not very good in the southeastern U.S., does that mean that utilities in that region of the country will be unable to provide their customers with electricity generated from renewable resources under a RES?

Answer. The Energy Information Administration has determined that utilities in the Southeastern U.S. would have access to significant amounts of biomass energy as well as the ability to import wind power generated in nearby states in order to meet a national RPS requirement.

Question 2. During the Bush Administration, the Energy Information Administration analyzed several different national RES legislative proposals. In each case, EIA determined that biomass would receive the most RES credits of any renewable technology eligible to receive credits. Please identify which regions of the country have the greatest biomass potential.

Answer. The Southeast and the Midwest have the greatest biomass potential and each region would benefit greatly if a national RPS is enacted.

Question 3. If the U.S. were to generate up to 25% of its power from renewable resources, how would this impact our country's reliance on natural gas to generate electricity?

Answer. Every credible study that has analyzed the impact of a national RPS has concluded that the RPS would significantly reduce the demand for natural gas in the electric generation sector.

Question 4. If the country switches to plug-in hybrids to power our automobiles and also adopts a 25% national RES, what would the impact be on oil and gas imports over the next 25 years?

Answer. Oil imports would be dramatically reduced because plug-in hybrids will require substantially less oil than conventional vehicles. In addition, if a national RES is enacted, plug-in hybrid batteries could very well be recharged with electricity generated with renewable resources which would then reduce our nation's demand for natural gas. The reduced demand for oil and gas should translate into significant reductions in imports.

RESPONSES OF SCOTT P. JONES TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. How much back-up power from conventional power plants is needed to meet a 20% percent RPS requirement by 2021? At what cost?

Question 2. Do you agree that as it now stands, our country's transmission infrastructure is woefully inadequate to achieve a 20 percent RPS requirement by 2021?

Question 3. What are the estimated infrastructure costs to meet the legislation's requirement? How realistic is it to get the necessary transmission in place in time to meet the hard and fast deadlines of the national mandate? Should Congress build some flexibility into the program if inadequate transmission prevents compliance?

Question 4. Given the different goals and definitions of renewable energy in the various state renewable energy standard programs, how does the majority staff draft ensure consistency and coordination of the state and federal programs?

Answer. Staff can ensure consistency and coordination of the state and federal programs by incorporating existing programs, such as the USDA Forest Service Forest Inventory and Analysis (FIA) program and programs initiated and implemented by the Farm Bill.

Question 5. Do you agree that any federal RPS program must account for the regional variations in the supply of renewable resources?

Answer. We would agree that any federal RPS program must account for regional variations in sources and supplies of renewable energy resources.

We believe that wood is necessary to meet a Renewable Electricity Standard. In a mosaic of energy sources, where each region of the country produces energy from its own, best indigenous resources, we seek a level playing field for wood. This level field of play will bring the same jobs and new local tax bases to forested regions as other regions will potentially enjoy.

But, we have deep concern that, under developing renewable energy markets, forestland may be disproportionately burdened by well-meaning but functionally stifling regulation, relative to other renewable energy sources and their land bases. Simple acknowledgements of the impracticality of applying agricultural principles to forestry is a small step in the right direction; for example, the seasonal-crop, closed-

loop approach to energy feedstocks just has no place in dealing with a crop that can take decades to culture, i.e., trees.

The negative impacts of national energy policies could create harm to all family forestlands in the U.S. Wood is a reliable feedstock, without the seasonal fluctuations or serendipity of weather that inhibit some other energy sources. And this resource (wood) is available now.

Question 6. In your testimony, you state that “forest practice policies are better determined at the local level to account for differences in local conditions and needs, rather than through prescriptive, one-size-fits-all federal mandates.” Doesn’t the same hold true for a national Renewable Portfolio Standard requirement where states are in a better position to develop programs that account for the differences in available resources?

Answer. The majority of our forests are owned by private forest landowners. Therefore, we have many individuals and companies working across this country to maintain healthy, working forests. In certain regions, we have state policy to offer guidance but in the majority of the country we have state developed and monitored “best management practices”. These voluntary guidelines assist landowners in the management of their forests to have minimal impact on water quality and various other aspects of the land.

Since we have variations of species composition, Boreal forests in Alaska, spruce and fir in the Pacific Northwest, southern yellow pine in the Southeast, ponderosa pine in the Southwest, and hardwoods in the Appalachians and Northeast, we are presented with a variety of specific needs that can only be addressed properly at the local level.

If and how this would apply to energy production in the United States is unclear to us at this time. However, we do believe that each region should be allowed to utilize the renewable resources that they have in order to meet any renewable goals that might be set at the state or national level.

Question 7. You note in your testimony that your members look forward to participating in the new markets created by new national RPS requirements, so could the RPS policy be a money-making proposition for your members? How do you propose to balance forest sustainability issues with the new market demands?

Answer. In short, yes, landowners do stand to benefit from the new markets for woody biomass that will result from a national RES. That being said, it is important to understand the basic economics of managing and maintaining a stand of timber, as well as the relative value of all of the products removed from the forest. In order to receive an acceptable return on investment (ROI) from a timberland investment, trees must be grown to their highest potential value. In most cases, this means growing trees long enough to be able to sell the timber for sawlogs and veneer. As part of this process, and in order to maintain a healthy, productive forest, timber stands must be thinned of poorer quality, less vigorous trees in order to free up the site resources for the better quality trees. In order to perform these thinning treatments, adequate markets must exist to be able to have an economically viable timber harvest of this material. Woody biomass for energy consumption, which will likely consist of smaller diameter trees, limbs, and tops removed during these thinning operations represent the lowest value product removed from the forest as well as the lowest percentage of overall income per acre during any specific harvest. It is highly unlikely the energy markets created by a National RES will drive a landowner’s harvest and management decisions. The higher value sawlogs will still be a requirement to justify a reasonable return on a timberland investment. As such, the same laws, standards, and protections that currently apply to all timber harvests across the nation and in all states will still provide the same level of protection.

Otherwise: In January 1905, the New York Times headline read, “TIMBER FAMINE NEAR, SAYS PRESIDENT ROOSEVELT”. The article said that “. . . this country is in peril of a timber famine . . . ’ as asserted by the President this afternoon in an address before the American Forest Congress. In the course of his remarks the President said: ‘If the present rate of forest destruction is allowed to continue, a timber famine is obviously inevitable. Fire, wasteful and destructive forms of lumbering, and legitimate use are together destroying our forest resources far more rapidly than they are being replaced . . . Unless the forests can be made ready to meet the vast demands which . . . growth will inevitably bring, commercial disaster is inevitable.’[1]

Here are the words straight from the Times. I think this forcefully makes the case for sustainability. Remember, pulpwood was non-existent when this quote was made, as Charles Herty (1867–1937) had not yet invented the pulping process. Only when we planted trees and encouraged markets did we end our brush with a timber famine. The destructive form of lumbering, then, was a process that is still

called “high grading” trees, today. Because at that time, only a high quality part of the tree was considered valuable for lumber, and the rest of the tree was left in the woods to rot or was burned. The point here is: markets cured the “timber famine”. Forest management for commodities did that. New markets did not create sustainability problems; they cured them.

Question 8. As you know, proponents of a national RPS point to biomass as the sole renewable resource available to meet the 20 percent by 2021 requirement. Do you believe that the Southeast has enough biomass to meet a 20 percent requirement and still fulfill demand for other wood products such as pulpwood and saw logs?

Answer. This is not an easy question to answer, but it is safe to say that in the Southeast, 100 percent of the “20 percent requirement” would not have to originate from forest biomass. It is also safe to say that forests in the U.S. South are accumulating significantly more woody biomass than is currently consumed annually and have done so for decades; indicating excess availability of woody biomass to meet new demand.

Some of the contemplated legislation has considered efficiency as a possible contributor. There are also many other forms of biomass available to help meet the standards such as mill residues and byproducts, urban wood, nursery and right-of-way trimmings, agriculture wastes, timber from salvage operations, storm debris, clean construction waste, etc. There are, although in much smaller quantities, other available renewable resources such as some possible solar opportunity in Florida, a small amount of geothermal in Louisiana and Arkansas, and potentially, with eased political pressures, some untapped hydros. All in all, biomass will still make up the dominant proportion of renewable energy in the Southeast, but the availability of these other options must be assessed to accurately reflect the percent of renewable energy that will ultimately come from biomass.

In the United States as a whole, similar to southeastern statistics, timber growth has exceeded the harvests since 1952. Growing-stock volume on U.S. timberland has increased 39 percent between 1953 and 2002. That is, the nation’s forest inventory accrued more volume than it lost by mortality and harvest by over one-third [2].

You may hear that adding a new RES market to existing markets will create an unsustainable resource. It is simply not true. We do not have enough markets for the wood that we are growing, as shown in the USDA Forest Service’s Resource Planning Act (RPA) data collected by the Forest Inventory Analysis program. The 2002 data showed that across all species in the United States, we were growing 34 percent more volume than we removed [3]. Now, with the reduction of forest products manufacturing, we have seen an increase in the amount of growth versus removal. The 2007 RPA data shows a 41 percent volume grown over removal [4]. The impact of the reduction of our forest products manufacturing is having a clear effect on the amount of wood being grown and the threat to the health of our forests and private forest landowners is eminent. We believe arguments to the contrary are likely disingenuous and perhaps more motivated by competition for raw materials, and/or feedstock preferences, and/or tax avoidance than resource sustainability. The forest resource is sustainable and this question has been asked and answered before. But, the willingness of forest landowners to maintain forestland as forestland has had too little attention. Federal forest policy must address the conundrum of what would motivate a forest landowner to continue to hold that investment when it is threatened by new and evolving forces; whether it is opportunities for better financial returns for their families, shrinking market access, or investment-dampening legislation and regulation.

Question 9. What are the transportation expenses associated with woody biomass? I understand that because transporting biomass is expensive, it is more likely to be used only near existing coal-fired power plants or in plants especially built for biomass. Is that correct?

Answer. Woody biomass is expensive to transport long distances. This is typically a function of the density of the biomass material and the moisture. Biomass (woodchips, needles, bark, sawdust, etc.) is usually loosely packed in a truck, therefore the amount of energy being transported per unit measure (ton, cubic foot, etc.) is much less than other fuels used to produce electricity. With regard to moisture, for every percent of moisture, it will take some of the Btu value of the biomass to evaporate that water, thus “stripping” some Btus away from the production of energy. Thus, the dryer and denser the material can be, typically, the further the material can be economically hauled. Due to this, it is advantageous to locate the consuming facility as close to the biomass source as possible. This is typically assumed to be within 50 to 80 miles of the consuming facility.

Question 10. Professor Lave notes that biomass is hampered by land limitations and that biomass is better used for transportation fuels. You’ve noted that

forestlands are being converted to other uses at a rapid rate. Do you agree that biomass is better used for transportation fuels instead of electricity production?

Answer. Where available and economically feasible, all raw materials can and should be used as sources for energy production, whatever the form of energy produced. Some feedstocks may be more economical regionally, and the market will determine that. But, the markets will make those determinations; hopefully with some initial stimulus to jumpstart these new alternative energy production opportunities.

Question 11. You noted that the definition of “renewable biomass” included in the 2007 Energy Independence and Security Act has excluded America’s natural private forest landowners from “participation in the initiative to establish a renewable fuels industry.” How would you change the definition of biomass in the 2007 Renewable Fuels Standard to ensure your members can participate in these new markets and to slow the conversion of natural forest on private lands to housing tracts? Do you think southeast states would be able to meet their mandated requirements if they are not allowed to use woody biomass to generate electricity?

Answer. Healthy working forests, either naturally or artificially regenerated, are dependent on viable, sound markets in which to sell timber. Without markets, the economic justification of keeping land in a forested state is lessened or completely disappears. Developing as broad a definition as possible, with the inclusion of the whole tree and all tree parts regardless of their natural or artificial origin, would be the most complete way of assuring that landowners have the optimal opportunity to continue to manage their forests as forests and does not heap disincentives on an endeavor that is currently burdened by external pressures to convert from forestland to other land uses.

The willingness of forest landowners to maintain forestland as forestland has had too little attention. Federal forest policy must address the conundrum of what would motivate a forest landowner to continue to hold that investment when it is threatened by new and evolving forces; whether it is opportunities for better financial returns for their families, shrinking market access, or investment-dampening legislation and regulation.

Urbanization will have the “most direct, immediate and permanent” effects on southern forests of all forces of change [1]. The incentives for forest landowners to convert forestland investments to residential and commercial real estate are led by population growth. U.S. Census Bureau [2] population growth projections between the years 2000 and 2030 are for 82.1 million new people. That is a 29.2 percent growth, and most of that growth will be in the regions heavily dominated by private forest ownership [3].

How will this growth affect forestland use? We are distinguishing—again, throughout this testimony—between sustainable forestland, sustainable forest resources, and that without the land there can be no resources. Nineteen million acres of forest converted to developed uses from 1992 to 2020 in the Southeast [4]. The need for homes, churches, public infrastructure, and other services of 21st century human existence will cause fragmentation of forested landscapes, which will have its greatest impact in the Southeast [5], the region with the highest concentration of family forestland, but with a lack of other regional sources of renewable energy other than forests. And private, family forest landowners who manage smaller tracts of land are at greater potential for development [6].

Traditional markets for forest commodities are trending offshore or are impacted by poor trade policy. For example, as fewer and fewer pulp/paper mills remain in this country, production has remained unchanged—or slightly improved—but, geographic distribution and access to those markets has degenerated:

- 136 pulp and/or paper mills closed, ’97–’07 (none have been built since 1989) [7]
- 331 softwood sawmills closed in the U.S. & Canada, ’95–’07 [8]
- 314 furniture plants closed, ’00–’08 (hardwood indicator) [9]

In legislation and regulation, if we are truly to meet renewable energy goals (whether electricity or biofuels), wood must be allowed to make its full contribution. Some well-meaning organizations want renewable energy, but want to dictate which forests can participate. Currently, 92 percent of our nation’s private forestland is natural [12]. In the southeastern United States, on private lands, 88 percent of forestland is natural [12]. However, with the current definition of “renewable biomass” for the Renewable Fuels Standard of the 2007 Energy Independence and Security Act (at its most restrictive), America’s natural private forestlands are excluded from participation in the initiative to establish a renewable fuels industry. This kind of policy creates disincentives for private forest landowners to continue to hold and manage their forestlands. Anecdotally, we know that this 2007 language has already resulted in acres and acres of tree removals for conversion to other land

uses. This same definition will result, we believe, in land dedicated to fuel production at the expense of other traditional markets.

In order to promote the continuation of sustainably managed forests on private lands, we must encourage markets for these landowners; voluntary markets. No definition that harms capital investment in energy facilities or taints the siting of those facilities can benefit the future of America's forestlands. Without broad, inclusive definitions for woody biomass, we are only encouraging the loss of private forestlands to other uses that typically are less environmentally friendly.

So, our growing population leads to conversion. Fewer markets and less market access leads to conversion. And the constraints of new laws lead to conversion. The message is that constraints on the resource lead to conversion of forestland to other uses. How can one argue that disincentives to keep an investment—in this instance, privately held forestland—improve the likelihood of its continuance or its sustainability?

Then, it is in the best interest of all who want to maintain a forested America to seek out incentives for forest landowners. The highest current concern to these landowners regards the definition of "woody biomass" in statute and regulation. That is, woody biomass should be defined as "wood" in addition to wood residues, wastes, and/or byproducts. Ultimately, we must sustainably harvest trees as pulpwood, sawtimber, poles, pilings, chip-n-saw, OSB, wafferboard, and "energy-wood." Landowners would like to see wood as an equal partner with grains, grasses, and all cellulosic feedstocks.

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RESPONSES OF SCOTT P. JONES TO QUESTIONS FROM SENATOR SESSIONS

Question 1. What are we trying to achieve through a Renewable Electricity Standard (RES)? What are the goals? By focusing solely on renewables, are we limiting our options to achieve an adequate supply of clean, low-carbon, reliable, and affordable electricity?

If the main concern surrounding RES is to have clean energy, then we should consider nuclear power. Nuclear power is produced in the United States, it has zero carbon dioxide emissions, and it does not put stress on agriculture products or the timber industry. Why has this source not been considered in the RES discussion?

Answer. If an RES, an RPS, or any other energy provision, act, or package is passed by Congress, all sources of domestic energy feedstock are needed and should be used.

But, please allow a correction to the implication that stress will be put on the timber industry. You may hear that adding a new RES market to existing markets will create an unsustainable resource. It is simply not true. We do not have enough markets for the wood that we are growing, as shown in the USDA Forest Services Resource Planning Act (RPA) data collected by the Forest Inventory Analysis program. The 2002 data showed that across all species in the United States, we were growing 34 percent more volume than we removed [1]. Now, with the reduction of forest products manufacturing, we have seen an increase in the amount of growth versus removal. The 2007 RPA data shows a 41 percent volume grown over removal [2].

The impact of the reduction of our forest products manufacturing is having a clear effect on the amount of wood being grown and the threat to the health of our forests and private forest landowners is eminent. We believe arguments to the contrary are likely disingenuous and perhaps more motivated by competition for raw materials, and/or feedstock preferences, and/or tax avoidance than resource sustainability. The forest resource is sustainable and this question has been asked and answered before. But, the willingness of forest landowners to maintain forestland as forestland has had too little attention. Federal forest policy must address the conundrum of what would motivate a forest landowner to continue to hold that investment when it is threatened by new and evolving forces; whether it is opportunities for better financial returns for their families, shrinking market access, or investment-dampening legislation and regulation.

Question 2. Why do you include energy sources that may yield some benefit in the future and do not have any short-term benefits, but continue to exclude nuclear power that has both short-and long-term benefits?

Question 3. The US consumes approximately 1,000 gigawatts of electricity every year. The RES legislation would require approximately 200 to 220 gigawatts to come from renewable energy sources by 2020. What percentage of the renewable energy mandate will be supplied by wind and why does wind have a larger potential than other renewable sources such as hydro or nuclear?

Question 4. In your opinion, how will the southeastern states meet their mandate requirements since wind is not a significant energy source in this region?

Answer. The southeastern states will need to tap their most plentiful renewable resource, woody biomass. However, this will not happen unless a broad definition of renewable biomass is enacted.

Question 5. How will a RES affect the price of electricity in southeastern states?

Answer. As with all renewable technologies, renewable power production is more expensive than current base load or peaking capacity. Thus, it can be expected that ultimately, any mandated renewable power mandate will increase the cost of electricity to the rate payer. However, the advantage of biomass energy is that biomass produces the least expensive power of all available and viable renewable technologies; is base load, meaning it produces power all the time as opposed to intermittently like wind and solar; and happens to be the South's most abundant renewable resource. Biomass, in general, has unique attributes among other renewable energy sources: it can be burned in existing coal-fired power production with relatively minor and inexpensive modifications; and it can be generated whenever the biomass developer or utility chooses.

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RESPONSES OF SCOTT P. JONES TO QUESTIONS FROM SENATOR MARK UDALL

Question 1. How important are markets for woody-biomass, such as the one that could be created by the RES, in addressing forest health threats including insects, disease, and wildfire, not only in Colorado, but across the nation?

Answer. Healthy forests and strong markets go hand in hand. As a part of maintaining and managing a forest, intermittent treatments to remove poor quality material, dead or dying material as a result of disease or insects, reducing fuel loads such as smaller diameter understory, etc. becomes necessary. The justification for a private landowner to be able to perform these treatments means that it must be economically viable, thus either break even or generate a profit. Any additional profit generated by the landowner will create cashflow that can then be use to meet other landowner objectives, often times putting money back into the land via establishing the "next" forest.

Question 2. By removing woody biomass in responding to forest health threats and utilizing it towards renewable energy goals, what types of activities can landowners take to ensure their lands continue to be managed sustainably?

Answer. Private forests are already regulated extensively via the Clean Air Act, the Clean Water Act, the Endangered Species Act, state mandatory and voluntary programs such as BMPs and state administered forest harvesting laws, cooperative agreements, and the like. All of these aim at maintaining the values that we deem as important from our nations private forests, such as clean air, water, protection of wildlife, recreation, aesthetics, etc. These standards apply to all harvesting re-

movals from the forest, regardless of the type of product removed, and will undoubtedly apply to the removal of woody biomass for energy. Continued operation under this vast array of protections should continue to provide the same level of protection currently enjoyed.

APPENDIX II

Additional Material Submitted for the Record

STATEMENT OF KELa ENERGY

KeLa Energy appreciates the opportunity to share our perspective on Chairman Bingaman's proposal for a national Renewable Electricity Standard or RES. Our company strongly supports policy efforts promoting use of renewable energy and we believe that our technology can help the nation achieve the renewable energy objectives specified in the Chairman's proposal.

KeLa has patented an environmentally preferable fuel technology that blends waste products that currently have very few end markets and combines these wastes with renewable biomass to form a solid fuel that produces numerous energy and environmental benefits. The blended product can be used by electric utilities to generate power or by industrial users to fire boilers for combined heat and power systems and other applications.

The components of the fuel are:

- Waste Carpet: carpet that is pulled from homes and businesses during demolition and renovation that would otherwise be destined for land disposal. Currently, landfills receive between 7 and 10 billion pounds of carpet annually.
- Recycled Plastics: plastic material diverted from landfills. Consumer and industrial waste—including difficult to handle mixed-stream plastics, plastic bottles, trays and other materials.
- Renewable, Carbon Neutral Biomass: saw dust and wood residuals (bark, limbs, trimmings) from sustainable forestry operations.
- Coal Fines: these so-called fines are just that—coal particles that separate from already-mined coal during transportation or preparation that are too small to process and lay in piles at impoundment sites. Currently, over 2 billion tons of coal fines are resting in 700 impoundment sites with 50 million tons added every year.

The waste carpet and recycled plastics serve as binding agents for the coal fines and biomass. The end product is a pellet that resembles coal but with many enhanced performance characteristics:

- Considerably higher (20 percent) BTU value compared to coal
- Quick ignition producing less smoke on start-up than coal
- Combusts efficiently with far less unburned carbon in ash than coal (29% v. 2%)
- Resists moisture so it can be stored outside

In addition to enhanced performance, the fuel produces important emissions reduction benefits. KeLa fuel reduces carbon dioxide (CO₂) emissions by almost 12 percent compared to coal. Sulfur emissions are reduced by 35 percent. Our certified test burns also demonstrate lower nitrogen oxide (NO_x) emissions, lower volatile organic compound (VOC) emissions and reduced emissions of hazardous air pollutants. These benefits are delivered utilizing fines from coal that has already been mined, maximizing efficient use of the resource. In addition, the blended product can substitute for coal in the fuel delivery and combustion systems of existing boilers without equipment modification.

The draft RES currently under consideration acknowledges traditional sources of renewable energy. We are concerned that this approach may risk excluding emerging fuel technologies like KeLa that blend renewable energy sources with waste diverted material to produce fuel that will help meet the legislation's objectives. We understand that a fuel comprised of renewable and waste diverted components may not compare to virtual emissions-free performance that wind and solar technologies boast. However, wind and solar capacity is not prevalent in every region in the country. Moreover, the reduced emissions and efficiency benefits that have been demonstrated in our test burns are real and suggest that this fuel and others like

it could serve as a critical bridge technology that will facilitate movement toward a green energy economy. As the Committee begins the process of further refining the RES proposal, we respectfully request that clarifying language be added to the bill that will allow emerging fuel technologies like ours to qualify in a national renewable electricity standard.

We thank the committee for creating an opportunity to comment on this important issue and look forward to working with you in the coming months to craft a workable and balanced renewable energy policy.

STATEMENT OF PLUM CREEK TIMBER COMPANY

INTRODUCTION

Plum Creek Timber Company is pleased to submit these comments to the Senate Committee on Energy and Natural Resources regarding the proposal for a Renewable Electricity Standard (RES). Plum Creek owns approximately 7.5 million acres of forest land in 19 states and is the nation's largest owner of private land and the largest seller of wood fiber. Plum Creek was also the first forest land owner to have its lands nationwide certified as sustainably managed under a third party program.

Plum Creek believes that woody biomass from forests can make an important contribution to the nation's renewable energy goals if allowed to do so, and should be provided equitable treatment with other feedstocks and renewable energy technologies. With significant experience in long-term forest management, Plum Creek is equipped and willing to provide meaningful assistance to the committee as you seek to formulate an effective RES.

Plum Creek is a member of the National Alliance of Forest owners (NAFO) and also of the Forest Landowners Association (FLA) who have both already submitted comments which we strongly support.

In our comments, we would like to highlight two important underlying concepts and two policy considerations as you develop a RES.

Two underlying concepts:

1. New renewable energy markets can enhance the viability of working forests and help ensure that the economic and environmental benefits that forests provide society will continue in the future. In other words, new renewable energy markets are good for forestry and long-term forestland ownership.
2. Meanwhile, forestry is good for renewable energy. Forests can help provide a diverse, sustainable supply of renewable energy feedstocks, and can help ensure that we meet our renewable energy goals at reasonable cost, therefore imposing no additional cost burdens on the federal government.

Two policy considerations:

- A. RES should contain a broad definition for renewable biomass in order to assure an adequate supply of resources to meet energy objectives.
- B. A RES should recognize the strong and effective existing regulatory mechanisms already covering forestry activities.

TWO UNDERLYING CONCEPTS

1. New renewable energy markets are good for forestry

The availability of energy markets for wood fiber provides forest land owners with a new tool to enhance forest health, to reduce forest fire hazard, and to justify investments in forest productivity. New wood fiber markets in renewable energy will promote thinning, forest health treatments and improved forest utilization, which is particularly welcome as traditional markets decline and, in some locations, disappear.

The development of fiber markets for energy in this time of rapidly shrinking pulpwood demand will provide an incentive for timberland owners of all kinds to invest in their forests and to keep them in forests rather than converting to other uses. Private forests can increasingly provide for our renewable energy needs as forest productivity increases while providing a valuable service in capturing carbon from our atmosphere as well as the abundant other values that forests provide the nation.

2. Forestry is good for renewable biomass

Our nation is endowed with a range of resources that can be used to achieve renewable energy goals, and the use of woody biomass from forests has some great advantages without which a RES is likely to fall short of its goal.

- Energy fiber can be produced as a co-product of forest harvests and does not require land use conversion.
- Biomass generated electricity provides base load power that can be used as a valuable backstop for other kinds of renewable electricity.
- Forest biomass can be produced on a year-round basis and does not require costly storage.
- Feedstock collection and transportation infrastructure is largely in place and will not require large scale infrastructure development.
- Forest biomass is plentiful in regions where other renewable energy resources are lacking.

TWO POLICY CONSIDERATIONS

A. A RES should contain a broad definition for renewable biomass

A broad definition for renewable biomass that includes whole trees on private forest lands is important primarily for two reasons.

The first is that a limited definition can severely constrain the amount of woody biomass that is available for meeting the RES. This limitation is unnecessary and poses the risk of eliminating this option as a viable contributor to the solution.

- Consider that production tax credits have been available as an incentive for the use of closed loop biomass for over 20 years and has not resulted in the production of a single megawatt hour from a forestry feedstock source since its inception. “Closed loop” is a definition that is limited to biomass that is specifically grown as an energy crop.
- The inclusion of wood that is “waste” or “non-merchantable” includes some additional material, but this additional material can only be collected after all other commercial opportunities are exhausted. Energy fiber should be allowed to compete in the market place with other uses of wood fiber.

Some contend that limiting the definition of renewable biomass is important because of a concern that new energy markets will encourage land owners to harvest all of their forests today rather than growing them for more valuable markets tomorrow. This contention is unwarranted since the value of the fiber markets is the lowest produced from a forest, and energy fiber is the lowest value among fiber markets, and is therefore unlikely to drive the landowner’s harvest timing decisions.

Secondly, a definition that considers one part of a tree as renewable and another part not to be carries with it unworkable chain-of-custody implications that would be a disincentive to woody biomass producers, especially given that energy material is often removed from the harvest site after being chipped or ground up.

B. A RES should recognize the strong and effective existing regulatory mechanism already covering forestry activities

Plum Creek is aware that certain interests are concerned that renewable energy incentives for wood fiber will create unintended consequences that need to be addressed and mitigated in the RES. These concerns are unfounded, largely because of the existing regulatory framework that governs forestry practices on forest lands throughout the nation at the state level. This approach has successfully enlisted landowners as partners with states without the force of direct federal regulation. To be effective as an incentive to private landowners’ contributions to renewable energy, a RES must avoid new direct federal forest practice regulation.

Every state with a forestry resource has a State Forester who is responsible for implementing a framework of practices that address environmental impacts related to forestry. This framework has been in place for decades. The State Foresters work closely with state water quality and wildlife agencies to implement oversight of forest management activities in their respective states. This accountability is supported by state sponsored monitoring which evaluates compliance with state best management practices, forest practice regulations, and accredited certification programs as well as evaluating effectiveness of the practices themselves. Results of this monitoring over years have demonstrated that this is a successful approach and is improving. In some places, the increased utilization associated with an available energy market (biomass harvesting) has occurred for over 20 years and has been incorporated into this monitoring and feedback loop that produces continually improving practices.

Additionally, federal involvement in forest practices adds a new cost that is unnecessary and which the federal government can ill afford.

CONCLUSION

Thank you for considering Plum Creek's comments on this important legislation. We look forward to working productively with a wide group of stakeholders to help achieve America's energy goals.

STATEMENT OF GEORGE FITCH, MAYOR, WARRENTON, VA

Please accept my comments on an important exclusion which needs to be addressed to realize the full potential of renewable energy resources. I would like these comments to be part of the record for the RES hearings:

The use of biosolids to produce different forms of renewable energy can make an important contribution to the goals of reducing our dependence on fossil fuels, reducing greenhouse gas emissions and increasing the supply of energy from renewable resources. As Congress has promoted the potential of other forms of biomass, and renewable sources, to be used in the production of fuels and energy, Congress should extend the same incentives to the use of biosolids in the production of fuel. All other forms of biomass including agricultural wastes, wood wastes and animal manures are identified as eligible biomass for certain tax incentives and financial assistance programs. Biosolids is not included. Specifically, section 48 of the IRS Code needs to be amended to extend the 30% investment tax credit to Combined Heat & Power and other renewable energy facilities that use biosolids to produce a biofuel. Also, Section 45 of the IRS Code needs to include biosolids as an eligible biomass which when used to produce electricity is entitled to the production tax credit.

Biosolids is used as a fertilizer in land application which often creates an environmental hazard because it can seep into the watershed and, in the case of Virginia and Maryland, end up in the Chesapeake Bay. (See attachment).^{*} Instead, with the same encouragement extended by legislation to other forms of biomass, biosolids can be used to create renewable energy.

(Gina, as you might recall when I testified back in February 2007, Senator DeMint encouraged me to look at all types of wastes for my waste to energy project to make Warrenton and Fauquier energy independent. Well, here's a waste that has been overlooked in the discussion and legislation on renewable energy)

Please let me know if you require any additional information.

STATEMENT OF THE BIOMASS THERMAL ENERGY COUNCIL (BTEC)

The Biomass Thermal Energy Council appreciates the opportunity to share our perspective on a proposed national Renewable Electricity Standard (RES). BTEC is an association of biomass fuel producers, appliance manufacturers, supply chain companies and non-profit organizations that view biomass thermal energy as a renewable, responsible, clean and energy-efficient pathway to meeting America's energy needs. BTEC engages in research, education and public advocacy for the fast growing industry of biomass thermal energy.

BTEC supports the committee's efforts at finding renewable energy solutions. Our concerns with the current draft RES are grounded in the proposal's narrow focus on electricity generation while overlooking the benefits of thermal energy as part of a broader suite of renewable energy solutions. Energy consumption in America can be divided roughly into thirds: one third electric generation, one third transportation, and one-third heating (thermal) (USDOE EIA). Federal and state energy policy has focused almost entirely on electric generation and transportation. State electric generation renewable portfolio standards (RPS) now exist in 32 states (Database of State Incentives for Renewables and Efficiency), providing powerful incentives for investment in and development of solar, wind, hydro, biomass and other electric generation renewable energy technologies. Federal production tax credits exist for biomass, solar, geothermal and wind electric generation. In recent years, federal policy has strongly supported development of renewable transportation fuels such as grain-based and cellulosic ethanol and biodiesel, through strong research and development support, demonstration project funding, and direct production credits and subsidies.

Yet virtually no such support exists for thermal renewable energy technologies (except for some limited residential tax credits). The use of biomass to produce thermal energy must compete for finite feedstocks with electric and transportation fuel technologies that are strongly supported through subsidies; an unlevel playing field

^{*}Graphic has been retained in committee files.

that places biomass thermal at a competitive disadvantage. For example, in New Hampshire there are seven commercial wood-fired power plants, collectively consuming approximately 1.7 million green tons of wood biomass annually to produce about 165 MW of electric output. Operating revenues at these facilities are supplemented by federal production tax credits and sale of renewable energy credits in New England states with RPS programs. Biomass heating must compete for wood resources that are artificially elevated in cost by these subsidies, yet the same public policy goals that provide the rational basis for these subsidies are also met by using biomass to make heat—at much higher energy conversion efficiencies than electric generation.

The Biomass Thermal Energy Council supports outcome-based energy policy, rather than technology-based energy policy. We believe that policy should encourage energy technologies that maximize efficiency, minimize carbon emissions, reduce or eliminate demand for imported fossil energy, and reduce harmful air emissions such as particulate matter, and acid rain caused by SO₂ and NO_x. Policy should support those technologies that achieve the greatest combination of net benefit in furtherance of these attributes. For example, biomass is converted to electric energy at an efficiency rate of about 20-40%; biomass is converted to a liquid transportation fuel at an efficiency rate of about 40-50%; biomass can be converted to heat energy at an efficiency rate of 85-95%. However, our federal policy promotes and encourages biomass electric and cellulosic ethanol technologies, but provides virtually no support for the much more efficient biomass thermal technologies. As the committee continues to refine the RES proposal, we respectfully request that provisions be added that recognize the considerable benefits of thermal energy. For example, we would support 1) adding language that requires biomass electric generation to qualify for renewable energy credits only if it meets a minimum efficiency threshold of 50 percent (with credit for thermal output), effectively requiring cogeneration, 2) allowance for renewable energy credits for any thermal output from existing biomass-fueled cogeneration facilities, and 3) a commitment by Congress and the administration to fully analyze the mechanisms to extend similar incentives and credits for thermal renewable energy technologies, e.g. biomass, solar thermal, and geothermal. We have specific suggestions for language that we would be pleased to share with the committee.

We thank the committee for creating an opportunity to comment on this important issue and look forward to working with you in the coming months to craft a workable and balanced renewable energy policy.

STATEMENT OF JOHN DROZ, PHYSICIST & ENVIRONMENTAL ACTIVIST, BRANTINGHAM LAKE, NY

Thank you for reaching out for inputs from experts and concerned citizens concerning the possibility of a national Renewable Portfolio Standard.

I am a physicist (with electrical energy expertise) with a 25+ year record as an environmental activist.

My concern with some of the terms and conditions of the Economic Stimulus package, is that federal and state governments are about to throw a few hundred billion dollars down the drain. We cannot afford that!

What's worse is that their likely plan will essentially assure (if Dr. Hansen, Al Gore, etc. are right) that we will have an environmental calamity of historic proportions.

This is all coming about for one very simple reason: solutions to our very real energy problems are being driven by lobbyists, not the science.

For instance, the carte blanche support of essentially all renewables—as if they are all roughly equivalent sources of electrical power—is inaccurate, and is not scientifically supportable.

We should indeed be seriously considering alternative sources of electrical power, but the criteria should be that they would only receive government support (e.g. via RPS, PTC, etc.) if they are at least equal to existing sources of electrical power.

“Equal” would be such well-defined grid considerations as reliability, predictability, dispatchability, cost, etc.

Determining whether or not alternatives meet this critical criteria is a straightforward matter: subject each candidate to scientific methodology.

So far, this has NOT HAPPENED with heavily promoted renewables like wind power and solar power.

The good news on all this is that I have a guaranteed solution—and one that will cost us nothing! [See attached article about EEA.]

Let me make an analogy here. Let's say I came to you 6± years ago and asked that the applicable senate committee do a well-researched series on subprime lending, and its offspring (e.g. derivatives).

PBS had a recent special about how (with all the financial geniuses we have in the US) that we've gotten ourselves into such a financial mess. Interestingly the experts interviewed identified the exact same reasons that exist today regarding electrical energy: 1) we were too trusting, 2) the plans were built on faulty premises, 3) no thinking outside the box was listened to, etc.

If an objective, comprehensive analysis had been done then, consider the extraordinarily enormous positive ramifications that would have had on hundreds of millions of Americans—indeed on billions of people world wide.

Without exaggeration, this situation is of equal magnitude to the subprime fiasco. Indeed there are many that believe that the fate of the planet is at stake based on what we do right now.

Please read the attached “RPS—An Illusion of a Solution” (PDF) for a different perspective on this matter.

In short, the implications of the energy policies we are adopting (e.g. RPS's, blind support for all things renewable, not genuinely supporting nuclear power, etc.) all will have EXTRAORDINARILY NEGATIVE ECONOMIC & ENVIRONMENTAL CONSEQUENCES for our country.

The solution is to carefully assess our options, and choose only those that have been independently and objectively proven to make scientific, economic and environmental sense.

STATEMENT OF LAURENCE D. WISEMAN, AMERICAN FOREST FOUNDATION

The American Forest Foundation, a nonprofit conservation organization that focuses on ensuring the continued viability of America's family-owned forests, believes that family forests offer tremendous potential as a source of clean, renewable energy to fuel both our nation's electricity and fuel needs. If Congress is to pass a renewable electricity mandate, such as that included in the draft legislation being considered by this Committee, it must allow for electricity generation from sustainable biomass from family forests.

Currently, biomass supplies roughly three percent of our total energy consumption in the U.S. Most of this is consumed through industrial heat and steam production at pulp and paper and other wood manufacturing facilities. If you consider current forest inventories, family forests can sustainably supply a significant portion of additional biomass, which can be used to heat and power millions of homes or fuel millions of vehicles.

While providing the nation with renewable energy, biomass harvesting from family forests can also increase the economic and environmental viability of these forests, helping landowners practice conservation and stay on the land.

Because of the benefits for family forest owners and the environment, the American Forest Foundation supports increased opportunities for the production of renewable energy from sustainably managed family forests.

To increase opportunities for renewable energy production from sustainable family forests biomass, Congress should enact renewable energy policies that:

- Allow all sustainably harvested forest biomass: renewable energy policies, whether incentives or mandates, should encourage the use of all forest biomass that is harvested sustainably, including with verification through appropriate mechanisms.
- Encourage family forest owner participation in markets: renewable energy policies should ensure that small family forest owners can participate in market opportunities and avoid overly burdensome requirements that would prevent landowners from participating.
- Ensure long-term viability of the industry: renewable energy policies should encourage a long-term, sustainable, renewable energy industry that supports strong rural economies and healthy forest landscapes.
- Help Supplement forest products markets: Renewable energy policies should supplement, not replace, existing forest products markets.
- Consider Impacts on Forest Resources: Policies that encourage energy production from forest biomass must consider both the short and long-term impacts of renewable energy markets on forest resources and avoid incentives that lead to unsustainable forest management practices.

Unfortunately, a previous market setting standard, the Renewable Fuels Standard, includes a very narrow definition of the forest biomass that is considered re-

newable under the standard. This definition restricts the use of biomass harvested from naturally regenerated forests, new plantation forests, and other ill-defined forest categories. We urge the Committee to avoid this prescriptive approach and instead encourage inclusion of all biomass that is harvested sustainably.

It will be very difficult to meet a renewable electricity mandate, particularly in the southern part of the U.S., unless sustainable forest biomass is considered renewable and can be used to meet the standard.

It is critical however, that we utilize this tremendous resource in a sustainable way—ensuring that family forests can continue to be a renewing, clean resource that the nation can depend on.

Each year, the American Forest Foundation trains 30,000 educators and helps over 90,000 family landowners manage forests for wildlife, habitat, recreation and sustainable products. Through our programs such as the American Tree Farm System®, and our conservation work on the ground, the Foundation strives to create new opportunities to help family forest owners stay on the land and manage it sustainably. Members of the Tree Farm system and participants in our other forest programs are committed to conservation and sustainable management, helping to ensure Americans have clean water and air, recreational opportunities, wildlife habitat, beautiful scenery, and products, including renewable energy.

The American Tree Farm System® is an internationally recognized and credible forest certification system, recently recognized by the Program for the Endorsement of Forest Certification Systems (PEFC). Family landowners certified in this system agree to comply with 9 standards of sustainability, have a management plan that guides their forest management activities over the long-term, comply with all federal, state, and local laws, and agree to periodic auditing and verification of their forest management.

Across the country there are over 10 million family forest owners who own nearly two-thirds of the private forestland in the U.S. These lands are critical national infrastructure, especially as climate change calls for additional carbon storage to reduce greenhouse gas emissions and demands increase for renewable energy to reduce our reliance on foreign energy sources.

Producing renewable energy from sustainable family forests, gives family owners additional markets and revenue streams for their products. As traditional wood products markets, like those for paper or furniture products, continue to decline, family forest owners are left looking for other sources of revenue to help them stay on the land and keep their investment in their forest viable. AFF strongly believes that any renewable energy incentives should help supplement, not replace existing forest products markets. We believe both market opportunities have value and we can accommodate both on the landscape.

While the markets for real-estate are low in many areas, family forest owners, particularly in rapidly growing areas, still feel the pressure to sell their land when developers come knocking. National averages point to a loss of roughly 2,000 acres a day of forests, as they are converted to parking lots, strip malls, and condominiums, never to be recovered. Annually, this amounts to about 1 million acres, an area roughly the size of the state of Delaware.

In addition to forest loss, forested tracts are being broken up into smaller tracts at alarming rates, as more people move into forested areas. The US Forest Service predicts that by the year 2030, roughly 44.2 million acres of forests will see substantial increases in housing density.

As you can see, the pressures are mounting, as family forest owners strive to stay on the land and keep their land as forests.

Yet communities across America need privately owned forests to ensure clean water, wildlife habitat, recreation, and the many public benefits forests provide. Good forest management practices can also help reduce flooding, decrease the risk of large and uncontrolled fires, and reduce carbon from our atmosphere. Each year, our nation's forests capture and store ten percent of our total U.S. carbon emissions.

Harvesting renewable energy from family forests in a sustainable manner will provide an important tool to help family forest owners stay on the land and maintain healthy, working forests in communities across America.

Most renewable energy markets will rely on small diameter trees, tops, limbs and residues, and trees removed to allow room for healthier trees to grow. Removing these materials can increase the health of forests, making the forest more resilient when impacted with insects, diseases, or wildfires. Often, removing these materials improves wildlife habitat and forage areas for key species.

Many existing forest management tools, such as forest certification systems, management planning, professional forester involvement, and the implementation of best management practices, are in place to help family forest owners to manage their lands sustainably. We urge the Committee to utilize these existing tools to the

greatest extent, and avoid new stipulations that would reduce the viability of the biomass market for small forest owners.

The American Forest Foundation looks forward to working with you to craft legislation that addresses the above issues and gain support for these concepts.

STATEMENT OF THE NATIONAL ASSOCIATION OF STATE FORESTERS

The National Association of State Foresters (NASF) greatly appreciates the opportunity to provide a written statement to the Senate Energy and Natural Resources (Committee) majority staff regarding a proposed federal renewable electricity standard (RES). NASF is a non-profit organization comprised of the directors of all state and territorial forest management agencies in our country. Our members have a public trust responsibility for managing and protecting two-thirds of the nation's forestland, which is held in private or state ownership. NASF views forests as a strategic national resource and offers the following recommendations as the Committee and Congress work toward a solution addressing climate change and the nation's economic and energy security needs.

I. NASF SUPPORTS AN RES THAT TAKES ADVANTAGE OF FORESTS' ENERGY AND CLIMATE BENEFITS

NASF promotes the development of policies and programs related to harvesting forest biomass for energy that ensure the sustainability of forest resources. State Foresters approach issues related to wood-based bioenergy and renewable fuels from the following perspective:

- NASF views forests as a strategic national resource and supports diverse and robust markets for the full spectrum of woody materials to allow landowners and forest managers to practice sustainable forestry. Emerging and existing markets for wood-based bioenergy and renewable fuels offer new opportunities to utilize previously unused, unmerchantable material.
- Intensive forest management can improve growth rates and productivity of forest stands resulting in increases in woody biomass (and other forest products) and greater ability of forests to sequester carbon.
- Woody-biomass is a secure, cost-effective source of renewable energy, which—in many cases—is produced locally and can generate revenue for urban and other forest-based communities. Biomass electric facilities can create between 2.4 and 5.0 direct jobs for each MWH of installed capacity.*
- Forest residues in the United States can generate enough electricity (56 million MWH) to power all of Wyoming, Montana, Delaware, DC and Vermont annually. These same 93 million green tons of residue could alternatively produce four billion gallons of ethanol to displace the gasoline used each year in Washington, D.C., Delaware, Maryland, New Jersey and Pennsylvania.*

II. FEDERAL POLICY SHOULD NOT INTERFERE WITH THE ABILITY OF THE NATION'S FORESTS TO SUSTAINABLY CONTRIBUTE TO RENEWABLE ENERGY

Forestlands in the U.S. can produce 368 million dry tons of biomass feedstock annually, yet the country currently derives only three percent of its energy from wood. Woody biomass as a fuel source has the potential to create thousands of new jobs and substantially increase the percentage of renewable sources needed to meet the nation's energy demands. Sustainably managed trees and forests can mitigate and adapt to climate change while providing other societal benefits such as clean air and water, wildlife habitat, recreation and thousands of forest products. Trees in urban areas provide enormous savings in commercial and residential energy costs and provide environmental air and water benefits beyond any other form of engineering. Wood-based bioenergy initiatives are also providing new markets that give landowners more options to retain and manage their forests while generating income and promoting economic development in forest-based communities. Realizing these benefits, however, will hinge on Congress' ability to craft federal policy that does not interfere with the ability of all the nation's forests to potentially contribute to renewable energy.

NASF has particular concerns with the current definition of eligible biomass found in the Energy Independence and Security Act of 2007 (EISA). As it stands, the definition severely constrains the ability of non-federal forest lands to supply

*Innovative Natural Resources Solutions. 2008. A Strategy for Increasing the Use of Woody Biomass for Energy. Prepared for the National Association of State Foresters Forest Markets Committee. Last accessed online at: <http://www.stateforesters.org/>

feedstock to our nation's renewable fuels goals. Mandating that the over two-thirds of our nation's forests that fall outside of federal ownership can only supply feedstock as a byproduct of other production ignores the fact that our state and private forests can supply biomass effectively and in an environmentally sustainable manner. Limiting the ability of forest landowners to profit from their forests increases the likelihood that the forest will subsequently be converted to some form of non-forested development. New plantations either established on bare land or converted from other vegetative cover after the date of enactment do not qualify as source material.

The current definition also effectively and practically eliminates the ability of our public forest lands to supply feedstock for renewable fuels. Permitting public forest lands to supply feedstock would provide a multitude of benefits, including improved overall forest health and the reduction of the hazardous fuels that serve as the lynchpin for catastrophic wildfire. The exclusion is overly restrictive—particularly in light of the extensive network of federal environmental laws (e.g., NEPA, NFMA) which guarantee sustainability—and essentially eliminates market forces from helping cover the rising costs of forest health and fuel reduction treatments at a time when warming climates and limited budgets suggest it is needed most.

III. FEDERAL POLICY SHOULD PROVIDE STATES FLEXIBILITY TO HELP ACCOMPLISH RENEWABLE ENERGY GOALS

State Foresters have statutory authority to ensure the sustainability of the nation's nearly 500 million acres of state and private forests. The forest types in each state are as diverse as the people and the economies in which they are situated. As a result, a national, one-size-fit all approach to defining forest management and land use policy in an RES will be problematic as it does not reflect the diverse and unique context for each and every forest and the laws of each state. NASF supports shifting focus of criteria away from federal definitions and towards addressing sustainability through existing tools, common forestry practices and other well established procedures. State Foresters are best-positioned to make decisions regarding sustainable forest biomass utilization that do not adversely impact local forest conditions.

NASF supports an approach that takes advantage of the strong environmental record provided by the vigorous network of federal and state laws and regulations alongside other voluntary programs that provide the necessary safeguards for woody-biomass removals. Accomplishing renewable energy goals should rely on the ongoing work of federal natural resource agencies, state forestry agencies and state forest management Best Management Practice (BMP) bodies, and nongovernmental natural resource professionals.

State Foresters want to ensure sustainability in an RES, while avoiding impractical prescriptions and pricing biomass utilization systems out of the range of feasibility. Sustainability requirements should be defined by the state, be feasible in implementation and enforcement, and should limit administrative, "transaction" and operational costs to allow all forest landowners to participate. Without these elements, forests—particularly from the 10 million small, non-industrial ownerships—will play a limited role in meeting the RES.

IV. BROAD DEFINITION OF FOREST BIOMASS SHOULD BE INCLUDED IN A FEDERAL RENEWABLE ELECTRICITY STANDARD

NASF urges a broad definition of renewable biomass that fully recognizes that all of our nation's forests are a renewable resource and ready source of biomass feedstock regardless of the political boundaries that surround them. Restricting wood from private lands and prohibiting the use of wood from federal lands are unnecessary constraints that leave out completely sustainable and readily available sources of green energy. This will needlessly hamper our nation's efforts to address greenhouse gas emissions and national security concerns related to reliance on foreign fossil fuel sources.

A broad definition in the RES can help address many of the barriers which stand in the way of meeting management objectives on all of the nation's forests. First, it can help generate critical markets for woody biomass which provide new income sources for families and individuals helping them cover their costs to own and maintain their forests. Keeping forestlands working and sustainable is a primary driver for our policy positions. Second, new markets are accompanied by new industry and an opportunity for communities to create and maintain family-wage jobs and diversity their economies. Third, local biomass markets provide new opportunities for public land managers to treat more "at-risk" acres, dispose of slash in way that is timely, and reduce emissions released by wildfires.

V. NASF IS READY TO HELP CRAFT RESPONSIBLE RENEWABLE ENERGY LEGISLATION
THAT BENEFITS THE NATION'S FORESTS

NASF commends the Committee and Congress on addressing the immense challenge of reducing the nation's dependence on fossil fuels. All renewable resources will be needed to meet the country's energy needs. Forests have a key advantage given their ability to produce energy independent of atmospheric conditions that other renewable sources are subject to. NASF believes there are constructive and practical options to consider as we work to ensure the sustainability of our nation's forest resource. We stand ready to help craft a RES that addresses sustainability concerns related to forests in a way that draws upon the strength of existing—and adapting where necessary—forest practices to meet local forest conditions.

STATEMENT OF THE SOCIETY OF AMERICAN FORESTERS

On behalf of the Society of American Foresters (SAF), which represents every segment of forestry in the United States with more than 14,000 members, please accept the following testimony for the Hearing Record on the Renewable Electricity Standard (RES) held February 10, 2009.

As an organization chartered to advance the science, education, technology, and practice of forestry for the benefit of society, the SAF believes that woody biomass energy from our nation's forests is part of the solution to supplying America with reliable renewable energy. As the Senate is aware, it is distressing that at a time when considerable efforts are being made to address global climate change—by preventing the conversion of forests to competing uses and by mitigating the likelihood of increasingly devastating wildfires—the definition of “biomass” in a federal RES could needlessly limit the management options available to federal land managers, and diminish the market incentives available to private forest landowners that allow them to resist development pressures and maintain their land as forest. We commend the Senate's efforts to craft a more scientifically, socially, and ecologically appropriate definition, which can help balance the nation's most pressing forest management needs and safeguard the important environmental and societal values our forestlands provide.

SAF supports strategies and policies that promote the development of economically and environmentally viable forest biomass energy production together with those that assist communities, forest owners, public forest managers, and local entrepreneurs in accomplishing urgent wildfire prevention and forest health improvement projects. This includes appropriately defining “woody biomass” in any federal legislation.

Increased utilization of forest biomass will also help combat global climate change and improve the nation's energy security by providing an abundant, renewable fuel resource as a substitute for imported fossil fuels in both public utility and industrial power generation facilities. On public lands in the West, many of the silvicultural treatments prescribed to reduce the risk of catastrophic wildfire and improve forest health will generate large volumes of forest biomass. Increased utilization of forest biomass can improve forest conditions in the eastern and southern states as well, where additional markets for low-quality and small-diameter trees also will enable forest managers to improve forest health. On other forests, both public and private across the country, forest health and restoration treatments are needed to control insects and disease and to improve wildlife habitat and watersheds. This type of management can be costly, as much of the biomass removed currently has little to no value. An RES, structured appropriately, would help to create a market for woody biomass. This, in turn, could encourage much-needed forest health or fuels reduction projects by offsetting some of the cost of biomass removal. An RES with a restrictive, one-size-fits-all definition would encourage the opposite.

Lately, there has been much discussion of the sustainability of biomass power generation under a federal RES. There are two potential approaches to addressing sustainability. An outcome based approach would allow a broad definition and the flexibility to manage forestland sustainably. Ideally, on private land, this would be done with the assistance of a professional forester who writes a management plan that addresses soil conservation, water quality, wildlife habitat, and biodiversity. This approach would allow management decisions to be site specific and unique to the forest stand being managed. It also would serve as a powerful incentive for landowners to consult with professional foresters to promote best management principles, and to allow management efforts to adapt to changes in the landscape or as new science and management techniques become available (i.e., adapting climate change or other disturbances).

The second approach is prescriptive and process-based, and would include a one-size-fits-all definition that precludes certain biomass through diameter limits or other prescriptive requirements. Although this method may give some interested parties a level of comfort, it is a disservice to our nation's forests and has no basis in science. Forests are complex, diverse, and in constant flux as a result of natural and man-made disturbances. No two acres are alike and, as such, no two acres should be treated alike. Thus, a prescriptive definition could serve as a disincentive to restore forest health in many areas, because federal requirements would be too onerous and may even contradict necessary silvicultural treatments. The 2007 Energy Bill's Renewable Fuels Definition of "renewable biomass" is a good example of this problem.

In regard to public lands, the SAF believes current laws and regulations, such as the National Environmental Policy Act (NEPA), National Forest Management Act (NFMA), and the Federal Land Policy and Management Act (FLPMA), provide more than adequate requirements for the sustainability of biomass removal. Past biomass definitions have excluded areas such as Wilderness, Wilderness Study Areas, and inventoried Roadless areas. Although this is politically understandable, from a forestry perspective it makes little sense. Some of these areas are in need of habitat restoration, insects and disease containment, or fuels reduction projects, which could maintain the character of these special designations while simultaneously improving forest health. Land managers in the Forest Service and Bureau of Land Management should decide what projects are needed and where. The biomass from these projects should count toward an RES that helps offset the cost of removal and stretch appropriated dollars toward the further improvement of public lands.

Finally, it's important to remember that forest resources are renewable. Although some biomass may be removed from public or private land, it will inevitably grow back and likely need to be removed again. There are roughly 20 billion board feet of new growth and 10 billion board feet of mortality on our national forests every year. In contrast, there are (on average) two billion board feet of removals. As we discuss the sustainability of biomass, which is imperative, we cannot forget that we are losing ground in our efforts to restore public forests. We also must remember that creating a viable biomass market through an RES will help protect private forestlands from development and safeguard the environmental and economic benefits on which we all depend.

STATEMENT OF THE NATIONAL ALLIANCE OF FOREST OWNERS

INTRODUCTION

The National Alliance of Forest Owners (NAFO) is pleased to submit comments to the Senate Committee on Energy and Natural Resources (Committee) majority staff draft for a Renewable Electricity Standard (RES) proposal. NAFO is an organization of private forest owners committed to promoting Federal policies that protect the economic and environmental values of privately-owned forests at the national level. NAFO membership encompasses more than 74 million acres of private forestland in 47 states. NAFO members are well positioned to help our nation meet its renewable energy objectives, and NAFO is prepared to work with the Committee and Congress toward that end.

Private working forests are a fundamental part of the strategic natural resources infrastructure of our nation, producing renewable, recyclable and reusable wood and paper products, sustaining plants and wildlife, producing clean water and air, and providing recreation experiences. Working forests also play a substantial role in helping this country achieve energy independence while reducing greenhouse gas (GHG) emissions. Forest biomass is a renewable energy feedstock that can help meet our national renewable energy goals in all regions of the country, if placed on a level playing field with other renewable energy sources.

NAFO asks this Committee to recognize biomass from private working forests as an eligible feedstock on an even playing field with other renewable energy sources as it develops a federal renewable electricity standard. The RES should recognize that forest owners already work within a well established framework of laws, regulations and non-regulatory programs and actions that promote and maintain responsible forest management, and will continue to do so as they help our nation meet its renewable electricity objectives.

II. OUR NATION WILL NOT MEET ITS OBJECTIVES TO INCREASE OUR RELIANCE ON SECURE, DOMESTIC SOURCES OF RENEWABLE ENERGY WITHOUT THE CONTRIBUTIONS OF WORKING FORESTS

Wood is a dependable, domestic renewable energy resource that can be utilized for energy production through a variety of processes like biomass generation, wood gasification, and conversion to cellulosic biofuels. Wood, wood residuals and other plant material can be utilized to produce steam and heat hot water boilers. Steam can be converted to electrical power by turbines or used to heat to buildings through piping distribution networks. Newer “wood gasification” technologies heat wood in an oxygen-starved environment, collect gases from the wood, and later mix the gases with air or pure oxygen for combustion. Wood gases can be cooled, filtered, and purified to remove pollutants and used as fuel for internal combustion engines, micro-turbines, and gas turbines.

As members of the Committee have discussed in the past, a federal RES that does not appropriately include all forms of forest biomass poses challenges to regions of the country where forest biomass is the prevailing renewable energy source and where wind, geothermal, solar or hydroelectric power are not expected to make a significant contribution. Biomass, for example, already produces roughly 53 percent of the nation’s non-hydro renewable electricity.¹

Existing state RES policies reflect the importance of utilizing biomass to successfully lower demand for traditional fossil fuels. To help meet renewable energy goals, at least 25 states and the District of Columbia have all included biomass as a renewable generation source. A federal standard that does not acknowledge or encourage the full use of forest biomass could jeopardize the nation’s ability to meet its overall renewable energy objective.

III. DEFINITIONS OF ELIGIBLE BIOMASS FEEDSTOCK SHOULD PUT WORKING FORESTS ON AN EVEN PLAYING FIELD WITH OTHER RENEWABLE ENERGY SOURCES

Definitions of qualifying renewable energy feedstocks should provide a level playing field for market access across all feedstock sources and encompass the full range of forest biomass, including trees and other plants, forest residuals (e.g., tops, branches, bark, etc), and byproducts of manufacturing (e.g., sawdust, bark, chips, dissolved wood retrieved from the paper-making process, etc). Presently there are at least four different definitions of qualifying forest biomass in federal statute². This adds complexity and confusion to project developers, biomass producers and federal program administrators who are required to determine how the various, and at times conflicting, definitions interact with one another.

NAFO has particular concern about the definition of eligible forest biomass found in the Energy Independence and Security Act of 2007 (EISA). As currently written, this definition places confusing parameters on significant acreages of private forestlands in the form of land use restrictions. These restrictions limit the ability of forest biomass to contribute to meeting the ambitious mandate to produce 36 billion gallons of renewable fuels annually by 2022.

The EISA definition significantly restricts the use of forest biomass from naturally growing and regenerating forests, which make up more than 90 percent of our nation’s non-federal forests. By doing so, it removes potential markets and viable economic options needed by private forest owners to support thinning for a variety of sustainable forest management practices, and who are already experiencing economic pressures from the steep declines in traditional markets such as solid wood and pulp and paper manufacturing. It also places forest biomass at a significant disadvantage to other biomass feedstocks, such as short rotation agricultural crops that require more energy, nutrients and water to grow, as well as other renewable energy sources.

If applied to a federal renewable electricity standard, the definition of qualifying forest biomass in the EISA could discourage necessary and appropriate forest management activities that promote forest health and sustainability. It also creates complex chain-of-custody requirements that could cause electricity producers to exclude large portions of potential feedstock supply in order to meet compliance require-

¹ U.S. EIA at www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/table3.html—Biomass is the primary energy source for 55.4 billion kilowatt hours of the 103 billion kilowatt hours of non-hydro renewable energy produced in 2007 (preliminary figures, subject to revision).

² Separate definitions of eligible forest biomass can be found in Section 45 (c)(3) of the Internal Revenue Code (26 U.S.C. 45(c)(3)); Section 203(b)(1) of the Energy Policy Act of 2005 (42 U.S.C. 15852(b)); Section 201(1)(I) of the Energy Independence and Security Act of 2007 (42 U.S.C. 7545(o)(1)(I)); and Section 9001(13) of the Food, Conservation, and Energy Act of 2008 (7 U.S.C. 8101 (12)).

ments. If identifying qualifying feedstock becomes too complex or costly, project developers may forego the development of facilities that use forest biomass altogether, thereby placing the overall RES in jeopardy.

IV. UTILIZING WORKING FORESTS WILL BOTH MEET OUR NATION'S ENERGY NEEDS AND HELP REDUCE ATMOSPHERIC GREENHOUSE GAS (GHG) CONCENTRATIONS

Experts have long recognized working forests as a source of real and verifiable reductions in greenhouse gases and a cost-effective source of industrial GHG offsets. The United Nations' 2007 Intergovernmental Panel on Climate Change (IPCC) highlights forest management as a primary tool to reduce GHG emissions. The IPCC states that, "In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest stocks, while producing an annual sustained yield of timber, fiber or energy from the forest, will generate the greatest mitigation benefit".³

Similarly, the EPA has concluded that there is "scientific consensus" that the carbon dioxide emitted from burning biomass will not increase CO₂ in the air if it is done on a sustainable basis.⁴ This position is supported not only by the IPCC, but also by the Energy Information Administration (EIA), the World Resources Institute (WRI) and other credible scientific bodies.

Appropriately including forest biomass in an RES standard would take full advantage of these carbon mitigation benefits in the energy context. Likewise, a policy that discourages forest biomass utilization will forfeit these benefits, particularly in areas where fossil fuels are the predominant source of energy production and where alternative forms of renewable energy, such as wind, solar and geothermal, are not viable options.

V. FOREST OWNERS WORK WITHIN A WELL-ESTABLISHED FRAMEWORK OF LAWS, REGULATIONS AND NON-REGULATORY PROGRAMS AND ACTIONS THAT MAINTAIN RESPONSIBLE FOREST MANAGEMENT

Private forestry operations are regulated by a fairly complex set of laws, regulations, and non-regulatory policies at the federal, state and local level. While the resulting framework is fairly complicated and can vary widely between jurisdictions, overall it has been very effective in improving the environmental performance of forestry operations, and can be expected to do so in the future.

Under this framework, working forests provide significant environmental benefits while providing important economic benefits like renewable energy. Watershed protection, wildlife habitat, carbon dioxide absorption, and other "environmental services" are currently provided by private landowners at little or no cost to society. Whenever policymakers consider new environmental requirements on private forestry, such as eligibility requirements for forest biomass intended for energy use, the implications for the economic viability of working forests should be considered. If new regulatory requirements reduce the private forest owner's ability to realize value from a working forest; or if new market limitations constrain market opportunities for working forests, private forest owners might be compelled to consider other uses for their forests, which could result in the reduction of many of the broader environmental benefits they provide.

Attached is a white paper describing the various federal, state and local laws, regulations and non-regulatory programs and activities influencing private forest management. We anticipate that this summary will be helpful to the Committee in comparing the environmental performance of private forests to other biomass feedstock sources and ensuring that new policies do not duplicate, complicate or jeopardize the already successful delivery of environmental benefits provided by current forest practices.

VI. NAFO IS PREPARED TO WORK WITH CONGRESS AND OTHER STAKEHOLDERS TO REALIZE THE CONTRIBUTIONS OF WORKING FORESTS IN ENERGY POLICY IN AN ENVIRONMENTALLY RESPONSIBLE WAY

NAFO is prepared to help develop a constructive approach to using forest biomass to help meet our nation's energy needs. Notwithstanding the strong record of envi-

³Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, page 543.

⁴U. S. Environmental Protection Agency Combined Heat and Power Partnership, Biomass Combined Heat and Power Catalog of Technologies, 96 (Sept. 2007) available at www.epa.gov/chp/documents/biomass_chp_catalog.pdf.

ronmental benefits private forests provide,NAFO is prepared to work with policy makers and other stakeholders to ensure that forest biomass, and all other sources of renewable energy, help meet our renewable energy objectives in an environmentally responsible way.

NAFO suggests the Committee apply the following principles when crafting legislation addressing the eligibility of forest biomass as a renewable energy source

1. Federal renewable energy policy should promote rather than discourage the use of forest biomass for renewable energy.—Federal policy, and definitions of qualifying forest biomass in particular, should be broad and inclusive so as to encourage forest biomass utilization and foster cost-effective compliance. If definitions and compliance requirements become too complex (e.g. the RFS definition), they will place forest biomass at a disadvantage with respect to other feedstocks or renewable energy sources and ultimately discourage its use. This, in turn, would jeopardize the overall goal of the RES and potentially reduce the carbon mitigation and other environmental services private working forests provide.

2. Federal policy should acknowledge and support existing federal, state, local, and nongovernmental forestry practices and capabilities.—Federal policy should acknowledge and support the existing framework of federal, state and local laws, practices and capabilities that influence current forest practices, including the ongoing work of federal natural resource agencies, state forestry agencies, bodies that administer state water quality BMPs, and nongovernmental natural resource professionals. This existing framework is well suited to address local conditions and needs. Federal policies should also assume that this framework will continue in the 6 long-term and be applied to all forestry practices, whether associated with traditional or emerging markets.

3. Federal policy should recognize that state and local resource professionals are best positioned to identify and address changing resource conditions and emerging needs.—Given the uniqueness and diversity of forest ecosystems across the nation, it is extremely problematic to set forest management or land use standards in a federal policy. Potentially changing resource conditions and needs are best addressed with a more tailored approach at the local level by state and local authorities using existing tools, common forestry practices, and well-established procedures.

State and local authorities should continue to fulfill their responsibilities to assess any changing resource conditions associated with existing or future forest practices, including the use of biomass to meet federal energy standards, and make a determination as to whether additional measures are needed to address emerging needs. If state or local authorities determine that additional measures are necessary, they should be allowed to continue the current practice of identifying and taking necessary corrective measures, following the BMP model that has proven highly successful across the country in protecting water quality.

VII. CONCLUSION

NAFO strongly supports our nation's efforts to establish new sources of renewable energy, and thereby reduce its dependence on fossil fuels and imported energy. America's working forests can play a fundamental role in meeting these new and growing energy needs. U.S. policies should encourage investment in forests as a source of renewable energy, by establishing non-restrictive definitions of forest biomass eligible for use in renewable energy programs.

A Federal RES, if adopted, should fully include forest biomass as a renewable energy source, and ensure that the definition of biomass encompasses the full range of forest biomass, including trees and other plants; forest residuals; and wood by-products including sawdust, bark, wood chips, and dissolved wood. In addition, Federal policy should allow state and local authorities to continue their current role in assessing resource conditions associated with forest management establishing, where needed, any additional measures that may be needed to address emerging resource needs associated with the use of forest biomass for renewable energy production.

Such an approach will enable our country to meet is renewable energy objectives and allow working forests to make their full contribution to our nation's renewable energy portfolio while providing important additional environmental benefits, such as reduced GHG emissions, clean water, wildlife habitat quality recreation and other environmental benefits Americans need and enjoy.

ATTACHMENT.—WHITE PAPER

THE ENVIRONMENTAL REGULATION OF PRIVATE FORESTS IN THE UNITED STATES

Private forestry operations are regulated by a fairly complex set of laws, regulations, and non-regulatory policies at the federal, state and local level. While the resulting framework is fairly complicated and can vary widely between jurisdictions, it has been effective in improving the environmental performance of forestry operations, and can be expected to do so in the future.

In addition to useful forest products, jobs and economic activity, working forests provide significant environmental benefits. Watershed protection, wildlife habitat, carbon dioxide absorption, and other “environmental services” are currently provided by private landowners at little or no cost to society. Whenever policymakers consider new environmental requirements on private forestry, such as eligibility requirements for biomass feedstocks intended for energy use, the implications for the economic viability of working forests should be considered. If new regulatory requirements reduce the private forest owner’s ability to realize value from a working forest; or if new market limitations constrain market opportunities for working forests, private forest owners might be compelled to consider other uses for their forests, which could result in the reduction of many of the broader environmental benefits they provide.

BACKGROUND

Private forests are currently regulated at the federal, state, and local level. The Federal Clean Water Act, Clean Air Act, Endangered Species Act, Insecticide Fungicide and Rodenticide Act, and the Coastal Zone Management Act each apply to private forest operations. These laws have been implemented through a variety of state programs, regulations, court decisions, agency precedents and policies. More narrowly focused State forest management regimes, local land use requirements, zoning and other stipulations have also been used to regulate or manage forestry operations. Additionally, third party sustainable forestry programs and a variety of voluntary agreements have also been used to achieve desired environmental goals.

There is considerable evidence that this complex framework of regulatory and non-regulatory activities has substantially reduced adverse environmental impacts from forestry, and will continue to do so in the future. While this paper will not exhaustively chronicle the scope of methods available to government at every level to regulate, manage, encourage or influence activities on private forests, many of the primary methods are listed here.

THE CLEAN WATER ACT

The Clean Water Act¹ is arguably the federal law of predominant relevance and application. Since forestry operations generally involve the construction of access roads and water crossings, as well as the disturbance or removal of trees and plants that would otherwise tend to control erosion, most of the environmental concerns related to forestry operations involve the protection of water quality and aquatic habitat. Forestry operations can also involve the disturbance of plant litter and soil, the application of herbicides and fertilizers, equipment lubrication and refueling.

Under the Clean Water Act, “point sources” such as industrial facilities and wastewater treatment plants with effluents that can be directly monitored at known outfalls are regulated with a permit system based on technology-based effluent limitations. Conversely, “non point sources” such as runoff from forests and farms cannot be so easily monitored, measured or regulated. This is particularly true with forestry, since forestry activities generally involve numerous relatively small operations occurring sporadically over large amounts of space and long periods of time, often by different landowners operating independently of one another. Complicating the situation is the fact that different forests, even those in close proximity with one another, may have vastly different characteristics in terms of topography, tree species, soil types, wildlife habitat, geology and hydrology. Consequently, the approach to protecting the environment from forestry activities must be adapted to local conditions and circumstances.

Efforts to control non point source pollution from forest operations have been fairly successful. National Water Quality Inventories conducted by the Environmental Protection Agency now contend that “the most significant source of water quality impairment to rivers and streams and lakes, ponds, and reservoirs is agriculture, and the most significant source of impairment to estuaries is municipal point

¹The Federal Water Pollution Control Act of 1972 (Public Law 92-500), as amended.

sources of pollution.”² Other significant sources include urban runoff, storm sewer discharges, and pollutants deposited from the atmosphere.³

Although forestry operations create fewer water quality impacts than agricultural operations, urban runoff and storm water, sewage plants and natural sources,⁴ major hydrologic events such as 100 year storms can nevertheless result in significant releases of sediments⁵ when sound forest management practices have not been employed. Although forest watershed protection efforts began on an ad hoc basis in the early half of the 20th Century, Section 208 of the Clean Water Act, adopted in 1972, directed states to develop watershed or regional water quality management plans to identify significant non point sources and assess their cumulative effects, and to “set forth procedures and methods (including land use requirements) to control to the extent feasible such sources.”⁶ In 1987, the Clean Water Act was amended to include, among other provisions, Section 319, requiring states to develop control plans for any non point source activities that were causing state waters to fall short of water quality goals. Taken together, sections 218 and 319 comprise the authority for States to control non point source pollution, with oversight by EPA.

To control non point source pollution from forestry operations, most states have adopted Best Management Practices (BMPs) designed to take regional climate, soils, topography, biota, legal, technical and socioeconomic factors into account. BMPs vary widely among jurisdictions, which is understandable since a BMP that is appropriate for a coastal plain pine forest in Georgia may be wholly inadequate for a mountainous temperate rainforest in Oregon.

In spite of their variations, there are aspects common to most BMPs across jurisdictions. The general philosophy of BMPs is to “avoid, minimize, and mitigate.” More specifically, BMPs will generally strive to 1) minimize soil compaction and the extent of bare soils; 2) separate exposed soils from surface waters; 3) separate fertilizer and herbicide applications from surface waters; 4) inhibit hydraulic connections between bare ground and surface waters; 5) provide forested buffers around watercourses; and 6) promote stable roads and watercourse crossings.⁷

Different states manage BMPs in different ways. Some states employ mandatory BMPs administered by State Foresters under a focused state forest practices act. Other states employ non-regulatory BMPs developed or approved by state agencies, with landowner education to encourage compliance, and authority for agencies to take action against landowners who do not comply. Regardless of the approach, BMPs and the broader non point source pollution prevention programs implemented by the states are subject to EPA oversight and approval. States whose water quality inventories fail to show continued improvement invite closer scrutiny and review by the EPA, and poor performance can result in grant funding reductions or a federal takeover of the state program. Over time, BMPs have become an accepted, well understood, widely adopted method of protecting water quality in the waters of the United States.

Although it is beyond dispute that BMPs are widely stipulated, it is appropriate to consider 1) how effective they are in protecting water resources and other environmental values, 2) what the compliance rates are for BMP implementation, and 3) the factors associated with high rates of implementation and compliance.

There is a high correlation between high water quality and forested areas. Most of the waters failing to meet EPA-approved water quality standards and requiring the establishment of Total Maximum Daily Load (TMDL) specifications are in urban or industrial areas. But this correlation alone does not prove the effectiveness of BMPs. Fortunately, a variety of watershed scale research projects in the published literature have evaluated the effectiveness of BMPs in the United States. These studies, some of which are summarized by Stednick and Ice,⁸ have found BMPs to

²National Management Measures to Control Nonpoint Source Pollution from Forestry. Page 1-1. EPA-841-B-05-001, United States Environmental Protection Agency, April 2005. (Emphasis added.)

³Ibid.

⁴National Water Quality Inventory: 2002 Report to Congress. EPA 841-R-07-001, United States Environmental Protection Agency, October 2007.

⁵National Management Measures to Control Nonpoint Source Pollution from Forestry. EPA-841-B-05-001, United States Environmental Protection Agency, April 2005.

⁶Section 208(2)(F)(ii) of the Federal Water Pollution Control Act of 1972.

⁷Olaszewski, R. and C.R. Jackson. 2006. Best management practices and water quality. In A primer on the top ten forest environmental and sustainability issues in the southern United States. NCASI Special Report No. 06-06. Research Triangle Park, NC: National Council for Air and Stream Improvement, Inc.

⁸Ice, G.G.; Stednick, J.D. (eds). 2004. A Century of Forest and Wildland Watershed Lessons. Bethesda, MD, USA: Society of American Foresters. 292 p.

be highly effective when they are used. Other studies point out that the major impediment to the protecting water quality is the lack of compliance with BMPs.⁹

A more expansive treatment of this subject is contained in a technical paper currently in draft¹⁰ by the National Council for Air and Stream Improvement (NCASI), soon to be published as a NCASI Technical Bulletin. Some of its key points are as follows:

- Forestry BMP prescriptions vary among jurisdictions due to a multitude of factors, but properly implemented BMPs are effective regardless of jurisdictional requirements;
- While monitoring programs and protocols vary among jurisdictions, rates of BMP implementation are generally very high.
- Jurisdictions having long-term monitoring programs in place have shown steady improvement in compliance rates over time.
- Forest certification programs, along with education and outreach programs, have had a positive and significant role in increasing BMP compliance with the various jurisdictional recommendations and/or recommendations.

This last point is particularly important. According to NCASI, the high rates of BMP compliance reported for industrially managed forestlands “are primarily attributable to sustainable forestry programs” such as the Sustainable Forestry Initiative (SFI), the Forestry Stewardship Council (FSC), and the American Tree Farm program. NCASI contends that these third party verification programs have been documented to result in higher compliance rates with BMPs.

BMPs have become, therefore, effective tools to advance the goals of the Federal Clean Water Act. As a consequence of this success, BMPs are increasingly being used to address ancillary issues such as wildlife habitat and other issues, some of which fall under the cognizance of other federal laws.

THE ENDANGERED SPECIES ACT

The Endangered Species Act¹¹ (ESA) applies to private forestry operations as a direct federal regulatory program which relies mainly on prohibitions against the “taking” of listed threatened or endangered plant and animal species. About 1,320 species in the United States and U.S. waters have been listed as threatened or endangered,¹² many of which spend at least part of their life cycle in forests or waters affected by forestry activities.

Although the ESA does not enlist the support of States or state programs in ways comparable to other federal environmental laws, States and localities have amended their laws, regulations, land use plans, policies and BMPs to help protect ESA-listed species and their habitats. In addition, some private landholders have entered into habitat conservation plans (HCPs) designed to improve habitat for listed species, although HCPs have often proven to be costly, difficult and time-consuming to negotiate.

Still other private landholders have been encouraged by the ESA to engage in land sales and exchanges to bring important habitat into conservation easements, non-profit ownership, or public ownership.

THE CLEAN AIR ACT

The Clean Air Act¹³ directs the Environmental Protection Agency to establish air quality standards protective of public health and welfare. States, in turn, develop plans and programs to achieve those standards. The direct impact of these plans and programs on forest management activities is to limit slash burning and prescribed fires. Indirect impacts include the demand for fuel wood in homes and other facilities. Finally, the motor vehicles and equipment used in forestry must be compliant with all applicable air quality standards.

⁹Ice, G.G.; Stewart, G.W.; Waide, J.B.; Irland, L.C.; Ellefson, P.V; July, 2007. 25 Years of the Clean Water Act: How Clean are Forest Practices? *Journal of Forestry*. Pages 9-13.

¹⁰National Council for Air and Stream Improvement, Inc. (NCASI). 2008. Compendium of state and provincial forestry best management practices. Technical Bulletin or Special Report In Draft. Research Triangle Park, N.C.: National Council for Air and Stream Improvement, Inc.

¹¹7 U.S.C.136; 16 U.S.C.460 et seq.

¹²See <http://www.nmfs.noaa.gov/pr/species/esa/>

¹³The Clean Air Act (42 U.S.C. 7401–7626) consists of Public Law 159 (July 14, 1955; 69 Stat.322) and the amendments made by subsequent enactments.

THE FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA)

The Federal Insecticide, Fungicide and Rodenticide Act,¹⁴ or FIFRA, establishes comprehensive programs regulating use of pesticides in forestry, agriculture and other situations. Under its provisions, pesticide compounds must be “registered” with (approved by) EPA for specific purposes and used only in accordance with EPA-approved “label” instructions designed to protect environmental resources. Pesticides which could pose environmental or health hazards if improperly handled or used by untrained people are restricted so they can be purchased and applied only by applicators trained and licensed by state agencies under EPA-approved programs.

Although FIFRA is applicable to private forest lands, the forestry market for pesticides is relatively small compared to agricultural and urban markets. Because trees grow for long periods compared to food and forage crops, forest-use pesticides usually are applied on particular lands only rarely (e.g. when establishing new plantations or responding to rare pest infestations), in contrast to agriculture, urban lawns, golf courses and other areas where the same chemicals are applied more often. It is not surprising, therefore, that environmental damage from forest-use pesticides has not been documented in the legal or scientific literature as a significant problem.

COASTAL ZONE MANAGEMENT ACT

Unlike the Clean Water Act, Endangered Species Act, Clean Air Act, and Federal Insecticide, Fungicide and Rodenticide Act, the Coastal Zone Management Act¹⁵ directly addresses broader land use issues rather than narrower environmental concerns. Twenty-nine states bordering on the West, East and Gulf Coasts, Pacific Ocean or Great Lakes participate in voluntary federal-state partnerships under the CZMA,¹⁶ including most major private timber producing states.¹⁷ These CZMA programs are developed with technical assistance and funding from, and then subject to approval of, the National Oceanographic and Atmospheric Administration (NOAA) through its Office of Ocean and Coastal Resource Management (OCRM). They address a wide range of issues including coastal development, water quality, shoreline erosion, public access, natural resource protection, energy facility siting, and coastal hazards such as hurricanes and flooding.¹⁸ Other states also address these issues through land use planning laws, local zoning ordinances, etc. Summaries of NOAA-approved CZMA programs are available through a NOAA website.¹⁹

An important component of CZMA programs is the Coastal Nonpoint Pollution Control Program under which states and territories with approved coastal zone management programs must develop and implement programs to control nonpoint source pollution from six main sources including forestry and losses of wetland and riparian areas.²⁰ Understandably, there are considerable variations among the states on how forestry issues are addressed in CZMA programs, reflecting differences in state constitutions, agency roles, court decisions, political and economic factors and environmental conditions.

STATE FORESTRY AND LAND USE PROGRAMS

States have adopted a wide variety of regulatory and non-regulatory programs addressing forest-related environmental and land use issues. Generally these are incorporated into federally approved programs under the federal statutes listed above, but many deal with other forestry issues as well. All 50 states have a State Forester, who is responsible for administering forestry programs and coordinating regulatory and non-regulatory programs administered by his department and other agencies.²¹

Some states have forest practices acts regulating all or most forest management activities. Some require reforestation after timber harvests. Some require local gov-

¹⁴ 7 U.S.C. 136 et seq.

¹⁵ Public Law 92-583, 16 U.S.C.1451-1456, as amended.

¹⁶ See <http://coastalmanagement.noaa.gov/mystate/welcome.html>, a NOAA website containing a map of participating and eligible states and territories. Illinois is the only eligible state currently not participating.

¹⁷ Except Montana, Arkansas, Tennessee, West Virginia and New Hampshire.

¹⁸ See <http://oceanservice.noaa.gov/topics/coasts/management/>

¹⁹ At <http://coastalmanagement.noaa.gov/mystate/welcome.html>. Click on the map to bring up a summary for a particular state.

²⁰ CZMA Sec. 3217; see also <http://coastalmanagement.noaa.gov/programs/coast—div.html>

²¹ See National Association of State Foresters website, <http://www.stateforesters.org/>

ernment approval to convert forestlands to non-forest uses. Some provide various kinds of tax incentives to encourage forest owners to keep their lands in forests. All states provide landowner education and technical assistance delivered by State Foresters, land grant colleges and universities, and other institutions, often with federal funding through the by U.S. Forest Service state and private forestry programs and Natural Resources Conservation Service extension service programs.

Some states have struggled to contend with stakeholders who wish to see stricter regulation of forestry activities, notwithstanding the nearly universal view that greater environmental benefits result when forest owners keep their lands in forests rather than convert them to other uses. If forest owners encounter environmental regulations or environmental litigation risks that make forest management uneconomic, many are often compelled to consider alternative ways to obtain economic returns from their property. The problem is compounded by the fact that most forestry investments are “sunk” at or near the beginning of a forest stand rotation while most of the economic return is received decades later when the stand is harvested. Therefore, willingness to invest in new forest stands can depend on perceptions about whether harvest will be allowed decades later and what costs might be imposed by regulatory programs at that time. Many states have addressed this dilemma by trying to keep both administrative “transaction” costs and operational costs of forest regulation reasonable, relying on landowner education and voluntary cooperation as much as possible, providing technical assistance on forestry issues, favorable tax treatment for forestlands and forestry activities, and other incentives to encourage owners to increase forestry investments and keep lands in forest use. This incentive-based approach has sometimes been criticized by those seeking more regulatory mechanisms, but overall it seems to have produced good results: The amounts of forestland have been gradually increasing in most states for about 90 years as forests have grown back on former farmlands and pasture lands at faster rates than forestlands have been lost to urban development and other non-forest uses. For example, in some New England states land uses have shifted from about 80% agriculture to about 80% forests over the last 100 years or so. Similarly in southern states many lands formerly used for grazing, tobacco, cotton or other agricultural uses have returned to forests. In most regions the volumes of standing timber and other biomass have been increasing and could increase further if landowners could be induced to increase forestry investments to enhance timber growth and thus increase their forestry-based economic returns.

VOLUNTARY COOPERATIVE ACTIVITIES

In addition to the regulatory and non regulatory approaches listed above, some innovative cooperative projects between private landowners, states, and private foundations have resulted in the protection of critically important natural ecosystems and the interests of private landowners and other stakeholders. Here are a few recent notable examples:

- In 2007, the Nature Conservancy, the Lyme Timber Company, Conservation Forestry LLC and the State of Tennessee completed the largest conservation transaction in Tennessee since the creation of the Great Smoky Mountains National Park in the 1930s, protecting nearly 130,000 acres of hardwood forests, mountains and streams on the Cumberland Plateau, through a combination of working forest agreements, conservation easements, and land purchases.
- In 2008, Plum Creek Timber Company and King County, Washington entered into an agreement to protect the Green River Watershed by granting the county a conservation easement at no cost to the taxpayer, in exchange for Development Credits that allowed for increased development density in urban areas.
- In 2007, Forest Capital Partners signed an agreement with the Minnesota Department of Natural Resources that will restrict development on more than 51,000 acres of their privately owned forestland in Itasca and Koochiching counties in Minnesota. State and private money was used to purchase a working forest conservation easement from Forest Capital Partners, the largest single transaction for conservation in three decades in Minnesota. The terms of the conservation easement, which is in perpetuity, guarantees public access for outdoor recreation, ensures sustainable forest management, and conserves wildlife habitat.
- In 2001, the Pingree family forest ownership in Maine, in partnership with the New England Forestry Foundation, created the world’s largest conservation easement (764,000 acres) designed to maintain this land in an undeveloped condition while promoting continued use of the acreage as a working forest.

These kinds of creative arrangements—employed alongside the methods already available to the federal, state and local governments to regulate, manage, or influence activities on private forests through direct regulation, regulatory and non-regulatory BMPs, land use planning, and incentive arrangements—constitute a rich set of tools that can be used in pursuit of national goals, while remaining responsive to local needs and interests.

WILL AN INCREASED DEMAND FOR ENERGY BIOMASS REQUIRE CHANGES IN FOREST
MANAGEMENT REGULATION?

As a result of the growing dependence of the United States of foreign oil and the desire to increase the supply of renewable energy sources, working forests have been increasingly viewed as an important potential source of wood and biomass for conversion into electricity or liquid fuels such as cellulosic ethanol. Some have expressed concern that a “biomass boom” might result in the wholesale conversion of working forests into plantations of short rotation woody crops for the exclusive purpose of energy production, resulting in a loss of wood supply for saw logs, wood chips for pulp, or other forest products. Still others have expressed concerns that such a conversion might result in a loss of some of the environmental benefits that working forests provide.

It is important to note the forest products industry is already a major producer and user of renewable electricity, and that biomass already produces roughly 53% of the nation’s non-hydro renewable electricity.²² Forest landowners have harvested biomass for energy in some locations for more than 20 years. In many instances, forest management that includes biomass harvesting has been included in BMP audits and third party certification programs.

Market history also suggests that wholesale conversion of working forests to dedicated energy crops is unlikely, since biomass intended to be used as an energy feedstock generally has a lower market value than other forest products. While wholesale conversion may be a valid concern in the case of “row crop” agriculture, where native grasslands, lands set aside for conservation purposes, or lands in food production might be converted to dedicated energy crops, such is not the case for working forests where energy biomass removals are likely to be in addition to, not in lieu of, the existing production of higher value products.

But there probably are opportunities for working forests to be managed, in the pursuit of higher value products, to produce increasing amounts of biomass for renewable energy production. To ensure that soil productivity, wildlife habitat, or other values are not compromised by the removal of additional material that would otherwise be left in the forest without an ancillary market for biomass energy feedstocks, some states are exploring approaches to revise existing BMPs, or to establish new guidelines in addition to existing BMPs, to guide in the harvest of biomass for large scale energy. Because BMPs or the development of other BMP-like guidelines can take local factors into account, it seems prudent that enhancements or adjustments to state practices and guidelines be considered without federal interference, particularly as we gain a greater understanding of how biomass conversion technologies and markets will actually evolve.

With respect to the other potential impacts of increased forest biomass utilization for energy on air and water quality, wildlife habitat, and pesticide use, it is difficult to speculate beyond broad generalizations. However, the removal of additional biomass could be beneficial to air quality to the extent that it reduces the need for prescribed burns, lowers the risk of catastrophic wildfire or displaces fossil fuels as an energy source. Water quality would arguably be unchanged, since the largest factor in non-point source pollution associated with forest operations involves the construction and placement of roads, and biomass collection would likely occur using the same roads and access points used for the higher value product harvests. Increased use of wood for renewable electric power generation is unlikely to occur to the detriment of ESA-listed species since most wood-based biofuels have been and probably will continue to be byproducts of timber harvests conducted primarily for production of lumber, pulp, paper and other traditional forest products. Increased use of wood for renewable energy could contribute to increased pesticide use in some intensively managed plantations, mainly at the time new crops are being established. However, healthy fast-growing intensively managed timber crops are seldom subject to the kinds of insect and disease problems that sometimes require use of insecticides in “overmature” timber stands or other stands containing large amounts of dead, dying

²² U.S. EIA at www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/table3.html—Biomass is the primary energy source for 55.4 billion kilowatt hours of the 103 billion kilowatt hours of non-hydro renewable energy produced in 2007 (preliminary figures, subject to revision).

or damaged trees that attract forest pests. Therefore increased use of wood-based biomass seems unlikely to generate widespread pesticide problems or increased use of pesticides in the forestry sector.

CONCLUSION

A robust yet flexible array of tools, in the form of federal, state and local laws, regulations, programs and Best Management Practices have measurably improved the environmental performance of forest operations in the United States. In addition, voluntary activities and third party sustainability programs have worked to promote environmental goals without sacrificing jobs and economic activity. As policymakers consider the imposition of new environmental requirements on private working forests, or market limitations on the participation of private working forests in emerging renewable energy markets, the implications for the economic viability of working forests must be considered to avoid inviting an unintended result—compelling private forest owners to consider alternative uses for working forests that do not provide the environmental services that provide healthy watersheds, wildlife habitat, carbon sequestration and similar benefits that are highly valued by society.

STATEMENT OF THE AMERICAN FOREST & PAPER ASSOCIATION (AF&PA)

INTRODUCTION

The American Forest & Paper Association (AF&PA) appreciates this opportunity to comment on the proposal to implement a national Renewable Electricity Standard (RES).

AF&PA is the national trade association of the forest products industry, representing pulp, paper, packaging and wood products manufacturers, and forest landowners. Our companies make products essential for everyday life from renewable and recyclable resources that sustain the environment. The forest products industry accounts for approximately 6 percent of the total U.S. manufacturing GDP, putting it on par with the automotive and plastics industries. Industry companies produce \$200 billion in products annually and employ more than 1 million people earning \$54 billion in annual payroll. The industry is among the top 10 manufacturing sector employers in 48 states.

The forest products industry is the leading producer and user of renewable biomass energy. In fact, the energy we produce from biomass exceeds the total energy produced from solar, wind, and geothermal sources combined. Sixty-five percent of the energy used at AF&PA member paper and wood products facilities is generated from carbon-neutral renewable biomass. The industry also is a leader in highly efficient cogeneration of electric power, much of it from biomass, both for internal use and for sale to the power grid.

Since 1995, all AF&PA members must subscribe to the principles of the Sustainable Forestry Initiative® (SFI), an independent forest certification system with rigorous standards that are developed by a multi-stakeholder board representing conservation groups and research organizations as well as forest landowners and manufacturers. With over 226 program participants and 156 million acres of certified well managed forests, the SFI® program demonstrates that America's forest and paper companies are committed to sustainable forest management. Our historic commitment to renewable energy and sustainable forest management demonstrates that a balance between the two is both possible and necessary.

AF&PA POSITION

While AF&PA supports the goals of a Renewable Electricity Standard (RES), we oppose a federal RES that does not provide equal treatment to the forest products industry's existing renewable energy generation with new generation, applies a one-size-fits-all approach, and which would burden the industry with increased costs for energy and its raw materials.

In order to potentially address some of these concerns, if a federal RES is enacted, it should:

Treat Energy from Existing and New Facilities Equally

The forest products industry is an unmatched leader when it comes to the generation of renewable biomass energy, and meets an average of 65 percent of its energy needs from carbon-neutral renewable biomass. Any RES should recognize this leadership and investment by treating biomass-based electricity from existing industry facilities equally with electricity from new facilities. There are currently 35 states (including the District of Columbia) that have RES mandates or goals. Twenty-five

of them allow power from existing facilities to qualify. As discussed below, an RES should acknowledge and promote the leadership of the states in making their determinations of qualifying power and also allow power from existing facilities to qualify.

The committee's proposed RES legislation would not provide tradeable credits for the renewable electricity generated by our manufacturing facilities. AF&PA believes the RES should be amended to fully recognize the renewable, carbon-neutral power generated by our manufacturing facilities, as it displaces fossil-fuel and helps to achieve the objectives of the RES.

As the demand for biomass-based power increases, AF&PA member facilities must compete with new market entrants for that biomass—the raw material for their products, as well as the source of their own renewable, carbon-neutral power. The ability of new market entrants' electricity to qualify for, and generate revenue from, renewable energy credits (RECs), while existing facilities' biomass-based electricity does not qualify, puts existing facilities at a serious competitive disadvantage.

Moreover, utilities complying with an RES typically are able to pass through their compliance costs in the form of a state public utilities commission approved rate increases to their customers (including AF&PA members, who are large ratepayers). Accordingly, regulated utilities can pay more for the wood biomass they purchase. In contrast, the forest products industry operates in a highly competitive global market in which manufacturers cannot pass on higher raw material and energy costs to consumers and still remain competitive.

Forest products manufacturing facilities are major customers of utilities. No one benefits if a policy compels those customers to compete against their energy suppliers on a playing field that is so uneven that the customers' survival is jeopardized. Since 2006, the housing crisis and the economic downturn have brought about the loss of 15 percent of the industry's workforce—about 190,000 jobs. These jobs are critical for the survival of the rural communities where our facilities often are located.

Finally, AF&PA supports provisions allowing energy efficiency to qualify as a resource to help a utility qualify under the RES. The proposed percentages of renewable power are extremely ambitious, and every source of possible clean energy will be needed to achieve the RES goals. The bill allows states to petition for energy efficiency (such as electricity savings from combined heat and power) to meet a portion of RES mandate. However, the bill only allows the output of a new combined heat and power system to qualify for energy efficiency credits, thereby putting our existing combined heat and power systems at a disadvantage as compared to new facilities.

Provide Incentives for Reliable and Affordable Regional Fiber Supplies and Promote Sustainable Forest Management

Renewable energy and climate change policies are projected to substantially increase demand on wood biomass as a source of bioenergy. Projections released by the Energy Information Administration (EIA) in December of 2008 indicate that biomass-based power generation by the electric power sector will increase from 10.4 billion kWh in 2007 to 133.6 billion kWh in 2025.

Wood is a renewable resource that differs from wind and solar power in that it has other uses and demands from existing sources. The combined impacts of the federal RES, state RES programs, the existing Renewable Fuel Standard, the cellulosic ethanol production tax credit, climate change policies, and Federal government support for new facilities to process wood biomass into energy have created concerns about the reliability and availability of fiber supplies in certain regions of the country.

Without efforts to increase overall biomass supply, the increase in demand for wood biomass for electricity will likely have unintended consequences on forest products manufacturing facilities that rely on woody biomass as their key raw material and energy source. While intensified management and research can increase forest productivity, incentives should be provided for programs that promote the planting of biomass feedstocks, including trees and short rotation woody crops, on farm lands, planted forestlands or degraded forestlands, and investment in biomass collection. In addition, biomass from Federal public lands should also be included as eligible biomass. Increasing the supply of biomass can help prevent displacement of existing manufacturing-based green jobs in rural communities.

Recognize State Leadership in Renewable Energy

As stated above, thirty-five states (including Washington, D.C.), have proactively adopted RES mandates or goals. Each state RES program is the result of the state's legislative process, ballot initiative or executive order and is carefully tailored to

maximize efficiency and minimize cost, based on local political realities, economic conditions and resource availability. Imposition of a federal RES that does not recognize these program standards could unnecessarily increase costs and impose needless economic hardship that state programs are designed to avoid and thereby undermine public support for RES programs.

State RES programs include critical provisions on definitions of qualifying resources and the required percentages of renewable energy and their associated deadlines, among others. A federal RES should not require states to revise their programs to be consistent with the federal program. This would require the unnecessary expenditure of resources to reconfigure programs already achieving progress on renewable energy, severely disrupting program implementation and hindering achievement of their goals.

Any federal legislation should ensure that investments made and progress realized under any state RES programs are preserved and permitted to qualify on a goingforward basis. We appreciate the provisions in the bill that attempt to harmonize the federal and state programs, but it does not appear those provisions achieve this goal.

The states should be provided with mechanism, similar to that in the Renewable Fuels Standard (RFS), which would allow a state to obtain a waiver from the RES if the Secretary of Energy makes certain determinations regarding economic or environmental impacts of RES implementation or the adequacy of the supply of renewable energy in the state or region.

AF&PA appreciates the opportunity to offer our views on the proposed federal Renewable Electricity Standard. We look forward to working with the committee in coming weeks to address the issues raised in our statement.

FREE FLOW POWER,
Gloucester, MA, February 10, 2009.

HON. JEFF BINGAMAN,
Chairman,

HON. LISA MURKOWSKI,
*Ranking Member, Senate Energy and Natural Resources Committee, 304 Dirksen
Senate Building, Washington, DC.*

DEAR CHAIRMAN BINGAMAN, RANKING MEMBER MURKOWSKI, AND MEMBERS OF THE COMMITTEE: Free Flow Power Corporation (FFP) is pleased to present these comments for the record of the Committee's Hearing on the Renewable Electricity Standard (RES). FFP applauds the Committee for advancing the discussion of a national RES, which FFP wholeheartedly supports. If enacted, the majority staff draft circulated by the Committee would be a landmark step in the development of the United States' renewable energy economy. However, without amendment of the term "ocean energy" in Section 610(a)(8) of the draft, the RES legislation would inadvertently exclude hydrokinetic energy generated from rivers, this country's best hydrokinetic resource. By amending the term to "marine and hydrokinetic renewable energy," as defined in the Tax Code (26 U.S.C. § 45), the Committee will ensure that all potential sources of clean, renewable energy are recognized.

FFP is a renewable energy company focused on hydrokinetic generation. Hydrokinetic generation uses tides, currents, waves, and free flowing rivers to produce electricity without building dams or diversions. FFP has developed a suite of proprietary turbine generator technologies and is obtaining regulatory approvals to develop over 100 hydrokinetic sites on the Mississippi, Missouri, and Ohio Rivers. FFP has offices in Massachusetts, Louisiana, and Washington and is developing projects in the states of Louisiana, Mississippi, Arkansas, Tennessee, Kentucky, Missouri, Illinois, and Indiana.

Globally, the hydrokinetic energy developers have focused primarily on ocean tides and currents, and the language of the draft RES bill reflects this attention. However, areas of high tidal energy are less plentiful in the United States than in other areas of the world, such as the British Isles, where several leading hydrokinetic companies are currently based. FFP is committed to developing its business in the United States and therefore has focused on in-stream hydrokinetics, harnessing the flows of America's rivers. Detailed analysis of over 80,000 potential hydrokinetic sites in the United States led FFP to concentrate on the Mississippi River Basin, which drains 40% of the continent and is the third largest river system in the world.

FFP is convinced that developing hydrokinetic sites in rivers provides a faster path to commercialization than starting with oceans, due to several advantages for river-based deployment. Fresh water is less corrosive and less susceptible to bio-

fouling than salt water. River sites are generally closer to end users of electricity than ocean sites, dramatically reducing the costs associated with expensive underwater cabling. The uni-directional flows found in rivers are much easier to engineer than bi-directional tidal flows, which range from zero to maximum capacity. The environmental issues in rivers have been studied extensively over time and are much better understood than ocean environments. The Mississippi River is an especially strong hydrokinetic resource because, unlike the other major river systems in the world, the energy of the Mississippi is focused through a fixed channel and levee system rather than being allowed to dissipate across a flood plain.

FFP supports the development of wind, solar, and other renewable energy resources, all of which are essential to building a diversified renewable energy portfolio. FFP believes that development of hydrokinetic energy in rivers in the United States must also be a component of a diverse renewable energy portfolio that includes wind, solar, and other renewable energy resources. Hydrokinetic energy generation requires no building of dams or diversions, eliminating the environmental concerns that have caused the decline in conventional hydropower generation over the past half-century. The advantages of hydrokinetic generation are many. Hydrokinetic energy facilities are ideal in areas where wind and solar resources are marginal, such as the Mississippi River Basin. Hydrokinetic sites are located primarily underwater and therefore have less visual impact than wind or solar. Hydrokinetic energy provides reliable energy output that can be predicted with precision days or weeks in advance. FFP believes that it can develop most of its hydrokinetic projects at a capital cost that is competitive with coal and less expensive than many other renewable energy resources, while creating robust operations and maintenance businesses that will employ thousands of American workers in jobs close to their homes.

FFP supports the inclusion of hydrokinetic energy resources in the draft RES bill and strongly urges the Commission to amend the language “ocean energy” at Section 610(a)(8) to include all categories of hydrokinetic resources, including river-based projects. FFP recommends implementation of the comprehensive term “marine and hydrokinetic energy,” which was passed by the Senate and House in the American Economic Stabilization Act of 2008 (H.R. 1424) last summer. “Marine and hydrokinetic renewable energy” is defined in the Tax Code, 26 U.S.C. § 45, as follows:

(A) In General.—The term “marine and hydrokinetic renewable energy” means energy derived from—

- (i) waves, tides, and currents in oceans, estuaries, and tidal areas,
- (ii) free flowing water in rivers, lakes, and streams,
- (iii) free flowing water in an irrigation system, canal, or other man-made channel, including projects that utilize non-mechanical structures to accelerate the flow of water for electric power production purposes, or
- (iv) differentials in ocean temperature (ocean thermal energy conversion).

(B) Exceptions.—Such term shall not include any energy which is derived from any source which utilizes a dam, diversionary structure (except as provided in subparagraph (A)(iii)), or impoundment for electric power production purposes.

Adoption of the term “marine and hydrokinetic renewable energy” will ensure that clean, renewable energy that is generated from the United States’ best hydrokinetic resource—its rivers—will be available to satisfy the requirements of the national RES. The availability of all sources of hydrokinetic energy is essential to ensure equality for electricity consumers in states without ocean resources or other viable sources of renewable energy.

Thank you for your consideration of these comments.

Respectfully submitted,

DANIEL R. IRVIN,
President and CEO.

STATE OF NEW JERSEY,
BOARD OF PUBLIC UTILITIES,
Newark, NJ, February 9, 2009.

Hon. JEFF BINGAMAN,
Chairman, Senate Energy and Natural Resources Committee, 304 Dirksen Senate Building, Washington, DC 20510.

Re: Comments on Proposed 2009 RES Legislation

DEAR CHAIRMAN BINGAMAN: The New Jersey Board of Public Utilities (BPU) respectfully submits written testimony on the Democratic staff draft for Chairman Bingaman's Renewable Electricity Standard in the context of the U.S. Senate Energy and Natural Resource Committee hearing being held on Tuesday, February 10, 2009. We applaud your commitment to establish a federal Renewable Energy Standard (RES) and the goals reflected in the recent draft RPS legislation released by Senator Bingaman (January, 2009 Discussion Draft). We also appreciate your concern about the potential impact that a federal RES may have on the 29 existing State Renewable Portfolio Standards (RPS). We would like to take this opportunity to comment on a few key issues, critical to the effective interaction between state RPS programs and a new federal RES.

New Jersey was one of the first States in the nation to implement an RPS and is widely recognized for its effective rules and standards that have helped advance renewable energy markets. Governor Corzine recently announced plans to increase New Jersey's RPS from 22.5% Renewable Energy by 2020 to 30% renewable energy by 2020—a goal that exceeds the proposed federal RES. In the year ending May 31, 2008, over 2.3 million MWhs of Class I Renewable Energy was generated to meet New Jersey's RPS which represents approximately \$23 million in renewable energy certificate (REC) sales, supporting countless jobs and economic benefits for the State and region.

Early movers like New Jersey have served as a laboratory of effective market design that have helped states and governments develop renewable energy programs that work across regions, electric grids and electric power markets. New Jersey was one of the first States to adopt the use of RECs to demonstrate compliance with our State RPS and provide market-based incentives to renewable energy generators based on REC value. As part of this initiative New Jersey also help finance and establish the PJM-Generator Attribute Tracking System (GATs) to track and verify RECs. While we are excited by the opportunity that a federal RES represents in terms of market growth and additional stimulus, we are also deeply concerned that a federal RES could significantly disrupt renewable energy markets in states like New Jersey and REC markets in particular. The enclosed document "Observations on State and Federal Interaction with respect to Renewable Portfolio Standards", January, 2009, developed by Clean Energy States Alliance (CESA), a multi-state RPS collaborative, provides more detailed recommendations that we hope you will consider as you advance federal RES legislation. Of particular concern to New Jersey however, are the following issues regarding the appropriate and effective interaction between state and federal RPS programs which we would like to bring to your attention:

1. State Preemption.—While the current draft legislation explicitly disavows state preemption, the language is general and other provisions of the bill could frustrate the ability of states to achieve higher targets such as those set by New Jersey. A federal RPS should contain comprehensive language to prevent both express and implied preemption of the existing state RPS laws and explicitly allow states to enact RPS requirements that differ from the federal requirement, particularly resource specific requirements such as a carve-out, set-aside or a multiplier. Resource specific carve-outs and multipliers, such as New Jersey's solar set aside, have been critical to the growth of important renewable energy resources, such as solar technology and customer-sited resources, that can not at present compete against the lowest cost resources or that face other market barriers. However, these higher cost renewables provide substantial public and energy values, and will experience significant future cost reductions as markets mature with the assistance of RPS programs across the country. A federal RES should also require that any renewable energy credits used to meet a state RPS that are in excess of the federal requirement must be retired rather than sold to utilities in other states or banked for future federal compliance. A federal RES should also prohibit state-specific RECs that do not meet the federal RPS from use for federal compliance.

2. REC Tracking System Integration.—The proposed legislation appears to envision a separate federal REC tracking system that operates in parallel to state or regional REC systems. This dual REC system could add considerable complexity, cause problems with clear title and existing contracts, and risk potential double counting thus undermining New Jersey and other state REC markets. We strongly recommend that a federal RES rely on the network of existing and emerging state or regional tracking systems, such as PJM-GATs, to issue, track and retire renewable energy credits and energy efficiency credits. PJM is the Independent System Operator (ISO) that coordinates and directs the operation of the region's transmission grid; administers a competitive wholesale

electricity market, the world's largest; and plans regional transmission expansion improvements to maintain grid reliability and relieve congestion.—PJM-GATS, which was launched in September 2005, tracks and verifies RECs within the PJM Interconnection control area serving 51 million people in all or parts of Delaware, Indiana, Illinois, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. PJM-GATS was established in response to the needs of state regulatory commissions, other state agencies and market participants for a single, regional, integrated system to implement state-imposed fuel mix and emissions disclosure requirements and renewable portfolio standards. The states and PJM Interconnection market participants believe this integrated system is the most cost-effective approach to serve the public policy and regulatory needs. It provides the greatest accuracy and efficient tracking of the ownership of the attributes.

We believe that a federal RPS tracking system should be required to consult with and rely on such existing tracking systems. The federal RES should also require DOE to reinforce minimum design and operational requirements to support a fully functional national credit trading market for renewable energy credits and energy efficiency credits. Where tracking capability does not exist, the DOE through the federal RES, can create, or delegate authority to create, one or more regional tracking systems.

3. National REC Definition.—While the proposed legislation defines what resources are eligible for receiving federal RECs, it does not define clearly what a REC and its associated attributes are. Federal legislation should provide a simple, standard definition for RECs that can lay the foundation for well coordinated markets. RECs will be fungible for national RES compliance and support a liquid market only if they have a clear and common definition. A federal RES should use the most universal definition of a REC, based on a unit of production, i.e. 1 MWh = 1 REC, with no derived attributes such as emission credits or allowances. States should also be allowed to retain specific authority to determine how and under what conditions electricity suppliers may purchase, transfer, trade, or retire any RECs or environmental attributes associated with renewable generation used to meet a state RPS.

4. Alternative Compliance Payments.—Most federal RES proposals have included an alternative compliance payment mechanism (ACP). Because state ACP and noncompliance penalties are so diverse, we recommend that state ACP/penalties do not count towards the federal RES. Because state use of ACP/penalty payments cannot be readily or directly linked to actual renewable generation, counting state ACP or penalty payments towards a federal RPS is not practical. In our view, all options that provide federal compliance credit for state ACP/penalties are problematic, regardless of design.

The proposed legislation also states that revenue from alternative compliance payments and penalties under the federal RPS should be granted to state agencies responsible for developing state energy conservation programs (i.e., state energy offices) to be used for energy conservation and renewable energy development. The bill provides funding preference for those states which have limited renewable energy capacity and for state programs that promote “innovative” renewable energy technologies. New Jersey is one of more than 20 states who administer a renewable energy fund that has proven highly effective in support of renewable energy project deployment and energy efficiency programs, with funding coming in part from state RPS alternative compliance payments. We strongly recommend that revenues generated by any federal ACP and penalty payments should be provided to states on a purely non-discretionary basis through a formula that allocates these monies back to the state where the compliance payments originated. New Jersey would consider the reallocation of these funds to other states a serious loss of funds that are currently being used to support New Jersey based resources, in particular New Jersey solar. The funds should be provided to the states for use in providing financial assistance to renewable energy projects, as is the common practice among state RPS programs. To do otherwise could seriously undermine public support for RES and weaken existing state clean energy programs. Also, the preference for use of these funds should be for supporting all renewable technologies, both mature and emerging, rather than targeted to only innovative technologies.

As Congress discusses the merits and design of a federal RES, we strongly recommend that a federal program be designed to complement and coordinate with New Jersey and other state programs to the extent practicable. We would

welcome the opportunity to work with your staff and other stakeholders to provide additional input and to review draft legislation.

Sincerely yours,

JEANNE M. FOX,
President.

STATEMENT OF PAUL N. CICIO, PRESIDENT, THE INDUSTRIAL ENERGY
CONSUMERS OF AMERICA

Renewable energy has an important place within the U.S. energy mix and should be expanded along with other domestic sources of energy. Importantly, the Industrial Energy Consumers of America (IECA) believes any decision to mandate renewable energy supplies should be left to each state—not the federal government.

Each state has significantly differing renewable resource supply profiles, electric transmission and distribution capacity and associated costs that must be considered. Expanding use of renewable energy will significantly increase the cost of electricity in a time when the public and the manufacturing sector cannot afford increased costs.

In general, renewable energy is our most expensive source of electricity when the total costs of production, the federal subsidy, increased cost of transmission, distribution and backup generation costs are combined. As such, we are concerned that an aggressive increase in the renewable energy share of the total power generation market will raise the cost of electricity to the manufacturing sector. Higher costs directly impact our competitiveness.

Sound U.S. energy policy demands more than simply an increase in the supply of renewable energy. It must be globally cost-competitive and reliable in supply.

Why? First, because the manufacturing sector competes globally with companies whose energy costs are often lower and sometimes subsidized by governments. (China is a good example.) And, when manufacturing successfully competes globally it creates domestic high paying jobs with benefits and exports that are critical to our country's economic recovery.

Secondly, because manufacturing facilities must have an instantaneous supply of electricity—not an intermittent supply, to operate a variety of diverse and complex processes, some of which that operate 24/7.

If Congress intends to pass an RES, it must lower the cost of the resulting delivery of electricity. The best way to accomplish that is to allow “energy efficiency and waste energy projects” to compete head to head with renewable energy sources. Competition between renewable energy and energy efficiency/waste energy will help drive down the cost of the delivered electricity. Every home owner, farmer and manufacturer will benefit.

- The market—not the Congress should determine winners and losers by letting renewable energy and energy efficiency/waste energy compete head to head.
- In many ways, energy efficiency/waste energy is better than renewable energy because it is delivering clean lower cost energy into the market that is more reliable . . . and less intermittent like wind and solar.
- Unfortunately, renewable energy is our most expensive form of electricity. Non-hydro renewable energy is 402% more expensive than nuclear and 227% more expensive than coal based electricity according to the US Department of Energy, 2006 data.

COST OF ELECTRICITY

(\$/MWH)

NON-HYDRO RENEWABLE: \$68.00

NATURAL GAS: \$49.51

NUCLEAR: \$13.54

COAL: \$20.80

An important unintended consequence of a federal RES mandate is the loss of competitiveness of the pulp and paper industry that uses biomass as a feedstock. The federal RES creates competition for the finite source of biomass in a regional area and could render paper mills in that region non-competitive creating additional loss of jobs.

