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RENEWABLE ELECTRICITY

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED TENTH CONGRESS

SECOND SESSION

TO

EXAMINE THE CHALLENGES AND REGIONAL SOLUTIONS TO DEVELOPING TRANSMISSION FOR RENEWABLE ELECTRICITY RESOURCES

JUNE 17, 2008

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CONTENTS

STATEMENTS

	Page
American Public Power Association	69
Bingaman, Hon. Jeff, U.S. Senator From New Mexico	1
Domenici, Hon. Pete V., U.S. Senator From New Mexico	3
Freeman, Bryce, Wyoming Infrastructure Authority, Cheyenne, WY	18
Furman, Donald N., Representing American Wind Energy Association	59
Halvey, Richard, Western Governors' Association, Denver, CO	15
Hanson, Gary, Chairman, South Dakota Public Utilities Commission, Pierre, SD	43
Kaul, Will, Transmission Vice President, Great River Energy, Maple Grove, MN	55
Kolevar, Kevin M., Assistant Secretary for Electricity Delivery and Energy Reliability, Department of Energy	5
Pickens, T. Boone, BP Capital, Dallas, TX	9
Reid, Hon. Harry, U.S. Senator From Nevada	25
Wright, Stephen J., Administrator, Bonneville Power Administration, Portland, OR	48

APPENDIX

Responses to additional questions	73

RENEWABLE ELECTRICITY

TUESDAY, JUNE 17, 2008

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

The committee met, pursuant to notice, at 10 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 and get started. We're about 2 minutes early. But we've got four of us here, so that's a good sign. We do have a couple of panels, so we will get started.

The topic of today's hearing is renewable electricity generation and transmission. The Federal Government has been trying to encourage development of renewable electricity since at least the late 1970s with the passage of the Public Utility Regulatory Policies Act. We've also had tax credits for renewables. We funded research and development for renewables.

States have passed aggressive renewable portfolio requirements or in other ways have set goals and targets for increasing the amount of electricity produced through renewable sources. In spite of all this, renewable generation is still only 3 percent of our national electricity supply. Recent studies have indicated that we can do much better.

The Department of Energy recently released a report indicating that 20 percent of our electricity could come from wind alone. The Western Governors' Association has adopted a goal of 30,000 megawatts of clean energy resources by 2015. Project 25 by 25 has accepted as a target that 25 percent of all energy should come from renewables by 2025.

All these studies and reports agree that we should extend the renewable energy tax credits, several of them supporting national renewable electricity standard. All of them also agree, however, that these actions are not enough and that one of the most important barriers to accomplishing these goals is the inadequacy of the existing transmission system.

I think it's important that we do all that we can to get transmission built to carry renewable electricity to where it's most needed. We need to be sure that FERC's rules for planning, siting, pricing, interconnection and openness of access are what they should be. Beyond that renewables do present unique problems.

Most wind, solar and geothermal resources are located far from the areas where the electricity is needed. The Upper Plains states are rich with the potential for wind generation. But these states are sparsely populated and far from large metropolitan, industrial centers. The same is true for solar potential in the Southwest and the geothermal resources in the Mountain West.

Development of transmission lines to carry such resources to load centers has to be done across many states and through many jurisdictions. Siting the lines is a serious problem. Often states that are not benefiting from either the jobs that come to the states where the generation is located or the electricity that is carried to customers in other states.

This makes it much more difficult for them to face the opposition that often accompanies such projects. Cost allocation is also a real difficulty. Customers in the states where the plants are built and where the transmission is essentially just passing through do not want to shoulder the primary burden of paying for the lines that are supplying somebody else.

This hearing we will look at a number of efforts to address these vexing problems. Let me, before introducing any witnesses, call on Senator Domenici for his opening statement.

[The prepared statement of Senator Salazar follows:]

PREPARED STATEMENT OF HON. KEN SALAZAR, U.S. SENATOR FROM COLORADO

Mr. Chairman and Ranking Member Domenici, thank you for holding this hearing on the difficult challenges facing development of electric transmission infrastructure for renewable energy resources.

Today's hearing has a decidedly western theme, and for good reason. The Department of Energy's official renewable energy resource maps, prepared by experts at the National Renewable Energy Laboratory in Golden, Colorado, illustrate the incredible renewable energy potential across the western states. Studying the existing electric transmission infrastructure map, one quickly realizes the conundrum renewable electricity project developers face: the best solar and wind energy are in sparsely-populated locations—locations without transmission capacity in place. The reason for this is simple enough. Over the past century our electric infrastructure has evolved from a "demand-oriented" perspective. That is, the first question when siting new generation capacity has been "where is growing demand located?" Yet today, renewable project developers are turning that question around and asking the supply-oriented question of "where is the best renewable energy potential located?"

Connecting renewables to the grid can be incredibly difficult. Planning and siting transmission is often plagued by jurisdictional disputes and not-in-my-back-yard resistance. Efforts to finance transmission are usually met with apathy if not resistance on the part of local rate-payers, who may not have any incentive to participate. I look forward to hearing today's witnesses describe the various approaches they have taken to meet these challenges.

I believe the Western Governors Association, in partnership with DOE, has shown incredible leadership in establishing the Western Renewable Energy Zones. The WGA's resolution to deliver 30,000 megawatts of renewable electric power to the nation by 2015 is both lofty and achievable—but only if we can meet our transmission infrastructure goals. The Western Renewable Energy Zones project is a textbook illustration of cooperation between states and the federal government to share and organize critical information to achieve a common purpose. While this is a wonderful start, my instincts tell me that there is a clear need for an even deeper level of interplay and coordination between local, state, and federal officials when it comes to siting the transmission we need.

I believe each of our witnesses and many members of this committee are driven by a common insight that renewable energy will enhance our energy, environmental, and economic security. Displacing future fossil generation capacity with renewables will reduce greenhouse gas emissions, save water, create new jobs, and boost local tax revenue in rural areas that so desperately need economic revitalization. The western states are blessed with world-class solar and wind energy poten-

tial, and we must do everything we can to ensure these resources are developed in the interests of the environment, local communities, and the nation as a whole.

I am eager to engage in this discussion and to hear the perspectives of our panel on these critical issues. Thank you, Mr. Chairman.

STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM NEW MEXICO

Senator DOMENICI. Thank you very much, Mr. Chairman. Let me say first for the committee's information and for yours, the distinguished Republican leader has called for a meeting of Republican senators who are interested in certain energy issues pending before his—for his deliberation. He's asked us to attend a meeting at 10:30 in his office.

I believe everybody that has an interest will go to that meeting. I myself will. I assure that I will wait until the last minute. I will come back from that meeting as soon as I can.

In my 36 years in the Senate I've worked hard to further the development of alternative energy. We've invested literally billions of dollars in research and development of renewable technologies like wind, biomass, solar and billions more to come, these statements so far similar to yours. We have done much of this bipartisan.

In 2005 I was very proud to help pass some of the largest tax credits for renewable energy in history. There's widespread agreement that they should be continued. Unfortunately the U.S. House is now insisting on raising taxes to offset these extenders, with another attempt this afternoon.

Even though Congress has never had to specifically offset tax credits for the renewable industry since the credits were first established in 1992. These tax credits are important enough to be extended without offsets. The Senate has already done this because they spurred development in the clean technologies sector and act as a stimulus to our economy without any doubt.

Over the past several weeks I've talked at length about my vision for our energy future. The good news is that there is widespread, bipartisan agreement on how to address energy issues in the long term. In the short term we don't always see eye to eye. But there is no question that the United States of America will have to import crude oil for many decades.

The foremost experts suggest that the bridge from now to that future without crude oil is about 40 years, meaning that we will be on crude oil of substantial quantities for 40 years. That's the bridge to the future and that's the short term problem we've got which we can't get rid of. It just means we will spend more and more of our money overseas for the next 40 years unless we have some way to abate that.

Increased domestic production, however, is just a bridge that will sustain us as we develop new technologies. It is important that we understand exactly what it will take to make sure we get ready for it when it's available. Particularly when it comes to our infrastructure needs.

That's the purpose of today's hearings. By year 2030, Energy Information Administration projects that a 30-percent increase in the U.S. electricity demand as estimated by that assumes significant efforts to improve energy efficiency and demand. However, with

only 6.8 percent growth in total transmission lines since 1996, our Nation's infrastructure development is simply not keeping pace with this system's demands.

The passage of the Policy Act of 2005 Congress sought to tackle this difficult issue. Setting needed transmission lines we directed DOE to study the country's transmission constraints and designate transmission corridors in areas of severe congestion. Importantly we provide FERC with backstop siting authority to counter NIMBY opposition to interstate lines.

These are significant Federal authorities aimed at insuring adequate transmission. Yet since its enactment and before they had even fully been implemented these provisions have been attacked by numerous interest groups, some Members of Congress and one of our Federal Commissioners. Of all our witnesses here today are wrestling with the thorny transmission issues from the planning and siting to cost allocation to the integration of intermittent resources.

I look forward to hearing from our panelists about these efforts. Because those engaged in reaching the collaborative processes are the ones who see the problems and must have solutions. I thought we took a giant step when we were bold enough to say for the first time that there would be condemnation authority under certain circumstances as we attempted to bridge stop gaps with power lines that were eminent for national security and national transportation needs.

With that I look forward to the witnesses. Thank you for this important hearing.

The CHAIRMAN. Ok. Thank you very much. We have two panels today.

On our first panel let me just start and indicate Senator Reid has asked to address the committee. He has introduced legislation, S. 2067, which tries to deal with this issue, and directly confronts the cost allocation issue which is a very important part of this issue.

He will be coming and joining this panel in the next few minutes, I'm advised, and we will just add him when he comes. Let me call the panel forward.

Kevin Kolevar is the Assistant Secretary for Electricity Delivery and Energy Reliability in the Department of Energy. Thank you for being here.

T. Boone Pickens is with BP Capital in Dallas, Texas. Thank you for being here.

Richard Halvey representing the Western Governors' Association from Denver.

Our other witness is Bryce Freeman with the Wyoming Infrastructure Authority from Cheyenne.

So thank you all for being here. I think probably given the time constraints everybody's got. Why don't we just go down the line and have each of you summarize the main points you think we need to understand. We will include your entire statement in the record.

Then, if Senator Reid arrives after whoever is testifying completes their testimony, we may allow Senator Reid to go ahead because of his time constraints. But Kevin, why don't you go right ahead and give us the perspective of the Department of Energy.

STATEMENT OF KEVIN M. KOLEVAR, ASSISTANT SECRETARY FOR ELECTRICITY DELIVERY AND ENERGY RELIABILITY, DEPARTMENT OF ENERGY

Mr. KOLEVAR. Thank you, Mr. Chairman, Senator Domenici, members of the committee for the opportunity to testify before you today on the challenges of building transmission to meet the growing demand of renewable electric generation capacity.

Decades of reliable electric service have made it easy to take for granted the availability of and access to electricity that powers our electronics, heats and cools our homes and operates our businesses. However, electricity is the backbone of our economy. Without a robust, reliable and affordable supply the operation of commerce, transportation, finance, food and water and our national security will be threatened.

As our Nation's economy continues to grow consumers demand for electricity will steadily increase. Even when counting for advances in energy efficiency, as Senator Domenici noted, the Energy Information Administration estimates that by the year 2030, U.S. electricity consumption will increase by almost 30 percent from the 2006 level. Although this a positive indicator of a growing economy, it means a significant amount of new demand on electricity generation and transmission systems that are already stressed and aging.

While we as a Nation should place great emphasis on updating and upgrading the grid we have today. That alone will not be enough. Significant new transmission will be necessary in the 21st century, largely because much of the Nation's future electricity demands will be met by generation sources located in areas that currently lack adequate grid connectivity. This applies in particular to wind, solar, nuclear and clean coal with carbon capture and storage.

This means that if you want to support clean energy, you have to support transmission expansion in appropriate areas. Meeting our future electricity needs will not occur overnight or with one solution, however. The new demand will only be met through national and regional cooperation on a combination of options such as new generation and transmission, advanced technologies, demand response programs and improved efficiency.

But there is good news to report. While the technical hurdles to continued, reliable electric service are considerable, they will be overcome. This Nation is rapidly surmounting our current technical challenges. I expect this will continue.

The less good news is an even greater obstacle remains. We must harmonize the multitude of local, State and Federal regulatory rules, such that they complement, not conflict with one another. To do this, we must coordinate efforts to meet electricity demands regionally and not just at the State level.

For that reason the Department strongly supports regional approaches to addressing the challenges of electricity resource planning. The present pattern of siting much generation distant from load and often in another State will continue for many years to come, so State level planning needs to be followed with regional scale planning and coordination. We will all benefit if states in our region are able to work in a coordinated way to bring their shared views to reality.

I'm pleased to note that the Department supports a number of activities designed to assist states as they think through the electricity choices. Initiatives such as the Mid-Atlantic Distributive Response Resources Initiative and the National Action Plan for Energy Efficiency are two good multi-State examples. The Western Governors' Association's Western Renewable Energy Zones effort is the latest. The Department is tremendously pleased to have the opportunity to support this ground breaking initiative.

The West has great potential for the development of renewables as evidenced by the work the states are doing on their own. But the scope of this work has been restricted to renewable energy potential within each State's boundaries. As we all know, renewable resources do not recognize State borders.

The Western REZ project brings together both policymakers and regulators from the Western states to consider as a body the region's electricity needs and consider whether and how the states can cooperate to address these needs. The process provides a framework to bolster the growth of renewable energy sources, increase regional electricity planning and work in an open stakeholder process to consider transmission plans for the deliver of these resources.

I can assure you that these multi-State initiatives are not easy. No single effort holds the solution for a region's electricity challenges. Nevertheless, these projects are important examples of how regions can respond to the challenge of using new sources of energy to meet the Nation's electricity needs.

The Department is pleased to be a part of all of these initiatives and hopes the Western REZ process in particular will serve as an example of how regions can work cooperatively to promote the development of clean and reliable energy sources. The maturation of these efforts continue technological advances and increasing market penetration of the broad range of clean energy technologies and modernization of the existing electricity transmission and distribution infrastructure are critical components of the President's vision of a cleaner, more secure, energy future.

I expect the DOE will continue its active support by making available both technical and financial resources and by working to raise awareness of the project's importance. This concludes my statement, Mr. Chairman. I look forward to your questions.

[The prepared statement of Mr. Kolevar follows:]

PREPARED STATEMENT OF KEVIN M. KOLEVAR, ASSISTANT SECRETARY FOR ELECTRICITY DELIVERY AND ENERGY RELIABILITY, DEPARTMENT OF ENERGY

Mr. Chairman and Members of the Committee, thank you for this opportunity to testify before you today on the challenges of building transmission to meet the growing demand of renewable electric generation capacity.

Decades of reliable electric service have made it easy to take for granted the availability of and access to electricity that powers our electronics, heats and cools our homes, and operates our businesses. However, electricity is the backbone of our economy, and without a robust, reliable and affordable supply, the operation of commerce, transportation, finance, food and water systems, and our national security will be severely threatened.

OE MISSION

The mission of the Office of Electricity Delivery and Energy Reliability (OE) at the Department of Energy (DOE) is to lead national efforts to modernize the electricity delivery system, enhance the security and reliability of America's energy in-

frastructure, and facilitate recovery from disruptions of energy supply. These functions are vital to DOE's strategic goal of protecting our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally responsible energy.

MEETING OUR FUTURE ELECTRICITY NEEDS

As our Nation's economy continues to grow, consumers' demand for more electricity will steadily increase. Even when accounting for advances in energy efficiency, the Energy Information Administration estimates that by the year 2030, U.S. electricity consumption will increase by almost 30 percent from the 2006 level. Although this is a positive indicator of a growing economy, it means a significant amount of new demand on electricity generations and transmission systems that are already stressed and aging.

And while we as a nation should place great emphasis on updating and upgrading the grid we have today, that alone will not be enough. Significant new transmission will be necessary in the 21st century, largely because much of the Nation's future electricity demands will be met by generation sources located in areas that currently lack adequate grid connectivity. This applies to almost every type of generation:

- Most of the Nation's best wind and solar resources are located in remote areas where existing transmission capacity is either minimal or non-existent;
- Most new nuclear plants will not be sited in populous areas, and will likely require additional transmission capacity;
- Clean coal with Carbon Capture and Storage (CCS) will presumably be sited near geologic formations suitable for CO2 storage, and may not be near major existing transmission facilities.

This means that if you want to support clean energy, you have to support transmission expansion in appropriate areas.

So it's clear that meeting our future electricity needs will not occur overnight or with one solution. The new demand will only be met through National and regional cooperation on a combination of options, such as new generation and transmission, advanced technologies, demand response programs, and improved efficiency. However, while the technical hurdles to continued reliable electric service are considerable, they will be overcome. This Nation is rapidly surmounting our current technical challenges, and I expect this will continue.

There is another obstacle, however, that does threaten the long-term provision of reliable electricity; we must harmonize the multitude of local, state and Federal regulatory rules such that they complement, not conflict with each other. And to do this, we must coordinate efforts to meet electricity demands regionally, and not just at the state level. Today, the greatest challenge to developing the appropriate network of wires and other facilities to reliably and responsibly generate and deliver the electricity to the American public is the difficulty of coordinating state and Federal permitting efforts and authorities.

DOE SUPPORT FOR REGIONAL ELECTRICITY PLANNING

For that reason, the Department strongly supports regional approaches to addressing the challenges of electricity resource planning. In most parts of the country, wholesale electricity markets have become regional in scale. The present pattern of siting much generation distant from load—and often in another state—will continue for many years to come, so state-level planning needs to be followed with regional-scale planning and coordination. To begin this process, each state, after considering its future electricity objectives, strengths, and needs, must engage with its neighbors to consider some basic questions that include:

- The mix and locations of the region's generation resources;
- What transmission facilities are required and where; and,
- How urban areas should strike an appropriate balance between local generation, energy efficiency programs, and imports via transmission.

We will all benefit if states in a region are able to work in a coordinated way to bring their shared view to reality. I'm pleased to note the Department has a number of activities where we are helping states think through electricity choices regionally: Initiatives such as the Mid-Atlantic Distributed Resources Initiative (MADRI), and the National Action Plan for Energy Efficiency are two good examples. The Western Governors Association's Western Renewable Energy Zones effort (WREZ) is the latest, and the Department is tremendously pleased to have the opportunity to support this groundbreaking initiative.

The WREZ project seeks to provide a framework to tackle the hurdles facing the western region as it seeks to bolster the growth of renewable energy sources, increase regional electricity planning, and work in an open stakeholder process to consider transmission plans for the delivery of these resources.

ORIGINATION OF WGA WREZ PROJECT

The idea for the WREZ project originated at a Western Governors' Association (WGA) meeting in Fort Collins, Colorado in September 2007 to discuss the challenges regarding new demand for renewable energy generation, the transmission necessary to deliver this power to consumers, and integration of these clean resources into the electric transmission grid. Out of this meeting came the idea to apply the Competitive Renewable Energy Zones (CREZ) concept used in Texas to promote the development of wind to the Western Interconnect. A number of Western states, including Colorado, Nevada, New Mexico, and California, have already begun or completed identification of renewable energy zones within their own state boundaries.

The West has great potential for the development of renewables as evidenced by the work the states are doing on their own. But the scope of this work has been restricted to renewable energy potential within each state's boundaries and, as we all know, renewable resources do not recognize state borders. Limiting efforts solely to the state level may lead to fractionalization among the states and complicate decisions for a resource planner. The WREZ project applies existing WGA policy and facilitates the work being done at the state level to the entire Western Interconnect to create a regional market for new generation capacity from wind, solar, geothermal, biomass and hydro technologies. But this is only half the effort; the next step is to consider the transmission needed to carry this load to consumer centers.

The work that the states, through the WGA, will be doing on this project will be divided into several phases;

1) Identification of the renewable energy zones (REZ) using technical resource assessments, economic analysis, and stakeholder evaluation and feedback;

2) Development of conceptual transmission plans and balancing requirements for REZs through existing Western Electricity Coordinating Council-sponsored transmission planning process; and

3) Coordinating load serving entity procurement to support development of a regional market for renewable energy.

Finally, later in the process, the WGA project aims to develop interstate cooperation to address permitting and multi-state cost-allocation issues. Phase I began on May 29, 2008, in Salt Lake City with the expectation that the initial phase will be completed at the end of this year or early 2009.

STAKEHOLDER INVOLVEMENT

Increasing public attention to new energy infrastructure requires greater stakeholder involvement to address concerns raised by opponents and to ensure a greater success in siting new clean energy projects. The WREZ project recognizes this point and has created an open and transparent process for including stakeholders of various interests, whether it is renewable generators, load serving entities, wildlife and land conservationists, Native American tribes, or local citizens groups concerned about their community.

NON-REZ RENEWABLES

While the WREZ holds tremendous potential for bringing considerable clean energy to the West, not all generation in the region is abundant enough to be located in specific, large "zones." In fact, some of the renewable resources, such as water power, geothermal, biopower, and distributed solar (or solar photovoltaics) may not be needed to be identified as existing in a "zone", or at least may be able to serve nearby load without new transmission.

Thus, Phase I of the WGA WREZ project will also include identification, particularly with GIS-based maps as appropriate, of non-REZ renewable resources. This will include a state-by-state estimate of potential for distributed renewables such as roof-top solar photovoltaics. By supplying information on all of the renewable resources that are available to states-not solely those to be used at the bulk power level-potential developers and load-serving entities can make their own choices on whether to tap remote, distant renewables, or local renewables to meet their customers' electricity needs.

DOE SUPPORT FOR CLEAN AND DIVERSIFIED ENERGY

Finally, on the Federal side, the Department continues to invest heavily in the research and development of a wide range of advanced clean energy technologies, including clean coal technologies with carbon capture and storage, next generation nuclear reactors, as well as energy efficiency and related demand side technologies. Indeed, the demand-side measures, such as conservation and increased efficiency, are often cheaper and can be implemented much faster than supply side resources. Maturation of these efforts, advancement of the previously mentioned technologies and their increased market penetration, and modernization of the existing electricity transmission and distribution infrastructure are critical components of the President's vision of a cleaner, more secure energy future.

As we move toward that secure energy future, renewables will play a leading role in helping to reach our goal of a clean and diverse fuel mix. The WREZ project is one example of how a region is responding to this challenge of using new sources of energy to meet the Nation's electricity needs. The Department is pleased to be a part of this initiative and looks forward to continuing its work with the Western Governors' Association and other regional state efforts to promote the development of clean and reliable energy sources.

This concludes my statement, Mr. Chairman. I look forward to answering any questions you and your colleagues may have.

The CHAIRMAN. Thank you very much.

Mr. Pickens, go right ahead please.

Senator DOMENICI. Mr. Pickens, before you start, might I just thank you for coming from a long distance today to help us with this very difficult problem. I know what you're going to say having seen it. I complement you on your boldness in terms of the suggestions you make.

Thank you, Mr. Chairman.

STATEMENT OF T. BOONE PICKENS, BP CAPITAL, DALLAS, TX

Mr. PICKENS. I'm probably am the oldest oil man here today. That's not in my notes. Thank you for having me.

Our country is in the most perilous time in history in terms of imported oil. Any serious way out of our energy crisis is going to take a real investment in our transmission system. I believe renewable energy resources are a viable solution to this crisis.

But any way you use to fix our dependence on foreign oil will depend on our willingness to invest and streamline our transmission system. Private enterprise will invest the money and will bill it cheaply and efficiently if Congress adopts clear, predictable policies. Senators, ladies and gentlemen, simply stated our main energy problem begins and ends with imported oil.

In the 1960 we were importing about 10 percent of our oil. In 1973 we were up to 24 percent. By 1991 was 42 percent. And now we're right on 70 percent.

We are getting close to exporting now $700 billion a year overseas because of our addiction to foreign oil. More than four times the cost of the Iraqi War. They get hard dollars from us and we get a product that's burned and gone in 90 days.

The price of oil will go up further. In 10 years we will have exported close to $10 trillion out of the country. If we continue on the same basis we're going now. It is the greatest transfer of wealth in the history of mankind. Our money is going to a few friends and several enemies.

I have a plan that can stop all this. It has to begin with the expanded use of renewable energy. We have the best wind in the

world, the United States does. It's time to get serious about using it.

The lynch pin of my plan is utilizing our abundant, domestic supplies of clean, affordable natural gas and putting it to work in transportation. Now more than 70 percent of our oil imports are used in transportation. Domestic natural gas is better than imported oil.

But to make it work we have to release natural gas out of power generation. It's wasted there. Wind energy can fill the void.

When you look at the pie chart for power generation you have 50 percent coal, 22 percent natural gas and 20 percent nuclear. Hydro and biofuels is miscellaneous. It's the rest of it.

In April 2007 the government released a study that showed that you could develop 20 percent of your power generation from wind. Sweetwater, Texas, a model for wind power. If you take the total Sweetwater complex it's about 2,000 megawatts.

Let me tell you just a something about Sweetwater, Texas. It is rural America. It was a 12,000 population town, went down below 10,000 and now it's recovered to above 12,000 because of the wind. It's a booming community. It can be duplicated over and over again in real America if you use wind power.

Shell Oil Company is starting a project just Northwest of Sweetwater, 3,000 megawatts. We're building the world's largest wind project in Pampa, Texas which is 200 miles North of Sweetwater. The Pampa Wind Project will be capable of generating 4,000 megawatts of electricity, enough to serve 1.2 million U.S. homes. There will be 2,500 turbines in that project.

If you go up through the wind corridor from Sweetwater to Pampa to Goodland, Kansas and on up Hastings, Nebraska and on to Canada, it is all good for wind, all of it. Fabulous resource for this country to have. It's in the right place too, in the central part of the United States. It's safe.

With wind power in place you can take the 22 percent of our energy supply from natural gas and move it to transportation. The 22 percent moved to transportation will replace all, underline all, of OPEC imports. This is a real number. Foreign oil imports represent a real threat to our national security and our national economy.

This is an emergency. We need to consider giving our next President emergency powers to deal with it. I would envision Eisenhower Federal Highway System back in the cold war. I think that's what it's going to take to do this.

It's got to be done quickly. Because of the $700 billion a year we're exporting out of this country. In the meantime Congress should bring leadership to the table and help address one of the critical shortcomings of wind, energy transportation.

If private enterprise is going to fund these efforts we need to ensure they are clear, predictable policies regarding siting, permitting, Federal land use, cost recovery, capacity rights in cities. There are many benefits to doing this including cleaner air, lower demand for water, marketing the natural gas available for feedstock for chemical and agriculture uses, making natural gas available for use for transportation fuel, contribute to the revitalization of rural

areas in central United States, take advantage of plentiful renewable resources to provide a secure supply of power.

Thank you, Mr. Chairman for holding this hearing today.

[The prepared statement of Mr. Pickens follows:]

PREPARED STATEMENT OF T. BOONE PICKENS, BP CAPITAL, DALLAS, TX

Chairman Bingaman, Senator Domenici, and members of the Committee, thank you for holding this hearing today. Our country is in a crisis caused by imported oil, and any serious solution to help us escape from this trap will require action by the Congress to promote private investment in our electric transmission system.

We must develop and promote every available domestic energy resource to solve this crisis, and the lynchpin to addressing our escalating dependence on foreign oil is a willingness and determination to invest in and streamline our electric transmission system. Private enterprise will invest money, and will build new transmission infrastructure cheaply and efficiently, if Congress adopts clear, predictable policies.

And Senators, ladies and gentlemen, simply stated, our main energy problem begins and ends with imported oil. Seventy percent of the oil we use is imported. With current oil prices, we are getting close to exporting $700 billion a year overseas because of our addiction to imported oil. That's nearly four times the cost of the Iraqi war. We purchase it from a few friends and a lot of enemies. We are paying for the war against ourselves and we have got to stop it, some way, somehow.

And the price of oil will go up further. Over the next 10 years, you're looking at exporting $10 trillion out of this country. It will be the greatest transfer of wealth from one country to other parts of the world in the history of mankind. It is a clear and growing threat to our national security, and our national economy. It has to be stopped. We are on the verge of losing our Super Power status. It's time to quit the blame game, and look for solutions and leadership to solve the problem.

For decades, every presidential candidate has talked about making us energy independent. That hasn't happened, of course, and the hole we've dug for ourselves just keeps getting deeper. In 1945 we were exporting oil to our allies. In the 1960s we were importing about 10 percent of our oil. By the 1980s it was 40 percent. In 1991 during the Gulf War, it was 54 percent. Now it's about 70 percent.

The world produces 85 million barrels of oil a day, or more than 30 billion barrels of oil a year. We haven't replaced that amount of consumption on an annualized basis since 1985. World oil production, I believe, has peaked, and the world's current oil fields are declining at the rate of 8 percent a year. The simple truth is we're never going above 85 million barrels of oil production.

The U.S. consumes 25 percent of the world's oil, with only 5 percent of the world's population. And what's going to happen when you're dealing with a supply capped at 85 million barrels and increasing demand as the Chinese, Indians, and rest of the underdeveloped countries around the world continue to use more and more oil?

I have a plan to fix this problem. I've stress tested it with government and business leaders across the U.S. in recent months. No one has found any major flaws in it. That said, if there's a better plan out there, it's time to hear it. The time for action is now.

Worldwide 70 percent of the 85 million barrels a day is used for transportation. To replace foreign oil, we need a major energy source that works for transportation. The domestic energy resources we have are oil, coal, natural gas, wind, solar, biofuels, hydroelectric and nuclear.

Natural gas and bio-fuels are the only fuels on the list that work to replace foreign oil for transportation. It's my belief that bio-fuels, while helpful, will not be the total solution.

So we have domestic natural gas as the replacement for foreign oil. Natural gas is clean, abundant, affordable and, again, domestic.

Natural gas is the second largest energy resource in the country. When you look at the piechart of power generation in the United States, you have 50 percent coal, 22 percent natural gas, 20 percent nuclear and 8 percent hydro and renewables.

If we take the natural gas we're using for electrical generation and move it to transportation, we can replace 38 percent of our foreign oil imports. And that, sports fans, is a real number.

Using natural gas for transportation is not a new idea. While there are only 150,000 vehicles running on natural gas in the U.S., there are nearly 8 million automobiles worldwide and that number is growing rapidly. We're getting beat by the French in nuclear power, and by the world in natural gas vehicles. We should be leaders, not laggards.

I know that we can do this because we've done it before. President Eisenhower led us to build an extraordinary interstate highway system. President Kennedy took us to the moon. And President Reagan led us to win the cold war.

If you could lower your foreign oil imports by 38 percent, you are reducing the amount of money you're exporting by 38 percent. Reduce $700 billion in foreign oil purchases by 38 percent and you'll see an annual savings of nearly $300 billion every year. $300 billion more would be staying inside our country instead of going to other countries overseas.

Nothing can reduce your imports better than this and you work with energy supplies right here.

But if we use all of that natural gas for transportation, how do we displace it from the nation's electrical grid?

The Sweetwater, Texas, wind complex is the model. If you take the total Sweetwater complex it will soon be producing 2,000 megawatts. The Shell Oil Company and TXU are getting ready to do another project just north of Sweetwater, and that's 3,000 megawatts. My company, Mesa Power, just put under contract with GE the largest single turbine order that has ever been given. The first phase of the Mesa Pampa Wind Project will be capable of generating 1,000 megawatts of electricity, enough for 300,000 average U.S. homes. When we complete the entire project, it will have the capacity to generate some 4000 megawatts and will have cost close to $10 billion.

We have the best wind in the world. It's time we got serious about using it.

The US wind corridor runs from Sweetwater to Pampa and Goodland, to Kansas, and Hastings, Nebraska and right up the line to Canada. The Department of Energy in April of this year showed that we could develop 20 percent of our electricity generation from wind using wind resources in the heartland of the United States.

Now, if you take wind power and use it to replace natural gas for electricity generation, you can release the natural gas to transportation. One million cubic feet (MCF) of natural gas equals 8 gallons of gasoline. At $4 dollars a gallon for gasoline, that means an MCF of natural gas is worth $32 dollars. And natural gas is selling today around $10 dollars an MCF.

We don't buy all of our oil from our enemies. We do have some friends—Canada and a few others. But most of the money that the world pays for oil goes into the hands of countries that are not our reliable allies. And some of that money is used right back against us in the war on terror. And so, we are funding the people who are trying to wreak havoc on this country.

The good news is we can use alternatives to address this problem. I am 100 percent for all alternatives. It is clear that renewable energy sources are an essential national security strategy. But in order for renewables to replace a meaningful amount of our imported oil, we need a national electricity transmission system to carry this electricity, be it wind, solar, biomass or other alternatives.

I have always believed that an idea has to be simple to be worth investing in. That is why I am building the world's largest wind farm. There is good wind in the area where I live in Roberts County in the Texas Panhandle, and I have the ability to transmit the electricity to markets in Texas that will pay for it. Good wind and transmission are the keys to my project.

I think that most of the witnesses here today have said that those two elements are key to every wind project. That is because, as can be seen from the Department of Energy wind resource map above, the large, flat, open areas with adequate wind are usually located a long way from where electricity is needed. Since we can't do much about where nature has put the wind, we have to do something about transmission to move the electricity to market.

Unfortunately, the large, flat, open areas with adequate wind do not already have transmission service because there has been no reason to provide transmission service to those areas, so we are looking at a need for green field transmission projects. The Department of Energy map below has identified the scale of transmission projects that will be required to move electricity generated from our wind resource heartland to the load centers that need it.

Greenfield transmission projects all face the same obstacles—siting, use of federal lands, permitting, equitable allocation and recovery of costs, equitable allocation of capacity, and availability of financing. Senator Reid's bill, S. 2076, which would provide for the identification of National Renewable Energy Zones, will definitely help move the process forward, but I would like to explain to this Committee what I see as the issues through the eyes of a wind project developer who has had to deal with each of these issues.

There is a sequencing problem that is circular—transmission won't be built unless there is generation capacity to be carried, and generation won't be built unless there is transmission. Furthermore, long distance transmission is only economic if it is

built to high capacity, which means that there must be a large amount of generation capacity in one place.

I happened to be lucky with my project, because I was already planning a water project that required a pipeline running in the same direction that I needed transmission for my wind project. The water project pipeline right of way eliminated the siting and permitting issues, but I still have to face the financing, and cost recovery issues.

As you may know, Texas has taken a leadership role in encouraging the development of wind generation. The Texas Legislature has adopted a renewable portfolio standard, which has encouraged development of wind projects in Texas, and has directed the Texas Public Utility Commission to identify competitive renewable energy zones (CREZ)—areas that are well suited to development of renewable energy production, and to adopt policies that will make transmission available to those zones.

However, the Texas CREZ process began in 2005, and is expected to be completed in 2013. I am eighty years old, and I don't have time to wait for the process to be completed, and neither does this country. I am building my own transmission line, which will ultimately travel 250 miles in Texas from the top of the Panhandle to near the Dallas/Fort Worth area, and I will have to pay for this transmission line myself. Not very many wind developers are in a position to do this.

I expect to sell my power in the Texas ERCOT market where prices are set by competition among power generators. As a result, I will not be able to simply increase the price of my power to cover transmission; instead, my profits will be reduced by my transmission line costs. This is a penalty that I am willing to pay in order to get my electricity to market first, but it is not a burden that most developers can bear. It requires scale and financial capacity. That is how I came to build the world's largest wind farm. It is the only way to pay for the transmission capacity as a private line, and it is only feasible within Texas. If you want to do it on a national scale, where the transmission line distances will be much longer, and utility regulations are different, Congress must act.

As I said earlier, I believe that the United States has the opportunity to build renewable electricity capacity to serve a substantial part of our needs for energy. By doing so, we will increase our energy security, improve our environment, revitalize the heartland of the United States, reduce the demand for natural gas to be used as fuel for generation, reduce the production of greenhouse gases, and reduce the demand for water to be used in thermal generation.

In order to secure these benefits, the issues that I identified above must be addressed. Let me take a moment to explain each of them.

Siting Authority.—As a land owner myself, I understand concerns that landowners have about having their property taken for public use. Quite properly, our Constitution provides protection for landowners from arbitrary takings. However, for more than 150 years, we have recognized that private companies transporting the common necessities of life, food, water, fuel and electricity, to cities and towns are serving the public interest because life in the cities would not be possible without those necessities. As a result, private companies, such as Mesa Power, have been permitted to use the power of eminent domain, subject to oversight by public authorities and the courts, to obtain rights of way for transportation corridors.

This system worked well for many years, but the large distances between the best sites for renewable power and the places where that power is needed have presented new challenges. The state public authorities that oversee the use of eminent domain by private companies are required to consider the benefits of the project to the citizens of their states. They often have indicated that they do not have the authority to consider the benefits to citizens of the United States who are not residents of their states in deciding whether a particular transmission line should be permitted to be located through the power of eminent domain.

No project sponsor likes to use eminent domain powers. It is slow, cumbersome, expensive and unpredictable. Negotiated easements that result in a landowner willingly permitting the use of the land are very desirable. However, a transmission line with a gap in it, no matter how small, is useless. Any single landowner along a transmission route can prevent the entire project from being constructed, no matter how important the transmission project, unless the transmission provider has the power of eminent domain.

Where state utility commissions are limited by state law to considering benefits to citizens of their state, eminent domain power may not be available to transmission developers wishing to cross the state without providing transmission service to local generators or local electricity users. This problem was recognized in the Energy Policy Act of 2005 (EPAct 2005), but the provisions of that act, which added Section 216 of the Federal Power Act, need to be extended. Section 216 currently requires that the Secretary of the Department of Energy conduct a study and issue

a report designating corridors as a National Interest Electric Transmission Corridors every three years. After the designation, a transmission service provider can seek siting approval from a state commission, and if the approval is not received within one year, the provider can then seek siting approval from the Federal Energy Regulatory Commission (FERC). This introduces a potential delay of over four years before the FERC transmission approval process can even begin. In addition, there is not agreement that the language of Section 216 authorizes a finding by the Secretary of Energy that transmission is "constrained" if there is a proposed project, but no available transmission at all. Congress needs to address these issues by amending Section 216 to direct the Secretary to make designations of National Interest Electric Transmission Corridors, outside the three year cycle provided by Section 216, upon request from a transmission service provider who can show that a renewable project developer has requested service and a load serving entity is willing to contract to purchase power from the renewable project developer. Congress also needs to provide the FERC exclusive jurisdiction to site new transmission for a renewable energy project in the specific case where a developer has contracted to build, and a load has contracted to buy the energy from, a new renewable energy resource.

Federal Lands.—Most long transmission lines in the west will cross federal lands. Again, while EPAct 2005 recognized the issue, and provided a process to address the issue, the process for approval should be streamlined. Either designation of a national interest electric transmission corridor by the Secretary of Energy or specific siting approval by the FERC should be sufficient to grant approval by the United States for use of any federal lands crossed by the proposed transmission line. (EPAct 2005 excluded lands included within the National Park System, the National Wildlife Refuge System, the National Wild and Scenic Rivers System, the National Trails System, the National Wilderness Preservation System, or a National Monument from its scope, and that exclusion should be continued.). Any affected federal agency could appear in the FERC proceeding to present any concerns regarding the use of federal lands included in the proposed route for the transmission line.

Federal Permitting.—Every transmission line involves multiple approvals from the United States and its agencies and departments. While it is possible with enough time and patience to gather the necessary permits, it introduces unnecessary delays into the process. Again, EPAct 2005 addressed the issue, but the process can be further streamlined. While EPAct 2005 did authorize the DOE to take the lead in coordinating federal permitting, and required other agencies and departments to enter into a memorandum of understanding with DOE regarding permitting projects, I believe that DOE should be authorized to issue the required permits directly after the transmission service provider meets the requirements for those permits in the judgment of DOE.

Equitable Cost Allocation and Recovery.—As I said earlier, a transmission line with a gap in it is worthless. Put another way, there is no useful way to build a transmission line in phases. It either is or it isn't. As a result, the costs are all incurred at once before it is available for use. Generation, on the other hand, can be built over time, and may have to be built as wind turbines become available. That means that the first wind turbines on a transmission line may not be able to bear the entire cost of the transmission line until more of the transmission line capacity is in use.

In Texas, we have concluded that transmission service to renewable energy production areas is socially desirable, and our legislature has directed our public utility commission to develop a plan, the CREZ plan that I mentioned earlier, to pay for extending transmission lines to serve areas where renewable resources are available to generate electricity. The cost of those lines will be paid by the ratepayers throughout ERCOT, because all of them benefit. In Texas, we have a very large market for electricity, the ERCOT market, so that several billion dollars of costs can be spread across the entire market without creating a problem for electric rates. In much of the rest of the country that is not true. It is a particular problem where many interconnected systems would benefit from new long distance transmission to serve renewable generation projects, but one utility or group of rate payers is expected to bear the entire cost.

Once again, Congress addressed the issue in EPAct 2005, but the FERC needs to be directed to spread the costs more widely, across multiple states if necessary, to reflect the benefits that are gained from the transmission project in terms of congestion relief, and other benefits. I propose that the FERC should be directed to allocate the costs of a new transmission line constructed under a special renewable resource NIETC designation that the FERC has sited to all load that benefits from the access to the energy transmitted over the line.

Equitable Allocation of Capacity.—If I put several billion dollars at risk, which I expect to do with my project, it does not strike me as fair that someone else can show up after everything is built, and all of the risks have been taken, and ask for and receive the right to use the transmission line that I paid for and force me to curtail transmission of my own electricity to permit them to use the transmission line. If you are going to encourage people to take entrepreneurial risk, you cannot expect them to do so if they can receive the same benefits by sitting back and waiting for someone else to take all the risk. Open access is fine for transmission lines that have already been in service for many years and their costs recovered, but there must be a process that encourages renewable generation developers to put up risk capital in return for preferred access rights to transmission capacity.

Financial Incentives.—I think that I may be unique both in being willing to take the risks that I am taking in developing my wind project, and in having the capital to do so. Most of the other wind developers, even the other developers who are willing to develop on utility scale, are not willing to take the sorts of risks that I am facing. I would not be willing to do it if I was not a believer that Congress will do the right thing in the end. Wind and other renewable energy projects need production tax credits. For projects like the one that I am building, we need predictable policies regarding the credits for the long period that it takes to get everything put together. My project, even with the favorable regulatory climate for wind in Texas, will take seven or eight years to complete. If we decide to build more generation capacity to supply other parts of the country, it may even take longer from start to finish. We need to know, when we start, what economic incentives will be in place when we get to the finish line. Otherwise, developers have to use very conservative assumptions about project economics, and many projects just won't get built. We also need targeted incentives for transmission lines, such as the loan guarantee program for rural renewable transmission lines that was proposed by the Senate in its version of the Farm Bill. Long distance transmission projects for renewable energy should qualify for an investment tax credit as well. When climate change legislation is considered again, if a cap and trade program is the mechanism, renewable energy projects should receive an allocation of credits based upon production. Those credits can be sold to help underwrite the cost of transmission lines to serve remote projects.

If we do these things, our country will benefit. We will see reduced demand for imported oil, cleaner air, a reduction in the price of natural gas, savings in demand for water to cool thermal generation, revitalization of the rural heartland in the central United States, and natural gas used for higher, better purposes than electricity generation.

We can fix these problems over time if we move a meaningful amount of our power needs to alternatives. There are no enemies, no competitors, nothing in domestic alternatives.

I have a mission ladies and gentlemen. That mission is to try to explain what I've just explained here. And no matter how many times I explain it nobody argues with me about it. Which is interesting because I wish somebody would jump up and say you're wrong and let me show you where you're wrong. And nobody does that. Everybody says, well, that sounds like a good idea.

So, I don't know whether it's a good idea or whether they don't understand.

Again, thank you Mr. Chairman for holding this hearing today. If we don't solve the energy problems we are facing, the hole we are in will continue to grow and swallow more and more of our scarce resources and will overwhelm us as a nation.

I am happy to answer any questions you may have.

The CHAIRMAN. Thank you for your statement. Mr. Halvey, go right ahead.

STATEMENT OF RICHARD HALVEY, WESTERN GOVERNORS' ASSOCIATION, DENVER, CO

Mr. HALVEY. Thank you, Mr. Chairman, Senator Domenici and members of the committee. In 2004 the Western Governors resolved to increase the amount of clean energy in the electricity generating portfolios of the Western States. To do that, excuse me, they created the Clean and Diversified Energy Advisory Committee.

In 2006, the Advisory committee provided the Governors with a series of recommendations on how best to achieve increased clean

energy generation including how to expand renewable energy resources. The Advisory committee recommendations made it clear that while there are many incentives that can stimulate renewable energy growth. Perhaps the most critical obstacle renewable energy faces is the availability of transmission.

In many cases high quality renewable resources are in remote areas where transmission does not exist. We all know building new transmission can be both a costly and lengthy, if not controversial process. For the past 2 years the WGA in collaboration with many of the key players from the renewable, regulatory, environmental and utility sectors considered how best to address the issue of transmission availability to accommodate renewable energy development.

The idea that generated the most enthusiasm was to identify those areas in the western electricity interconnection that have the greatest commercial potential for development based on a number of factors, the quality of the renewable resource, environmental characteristics and the cost of plant construction and transmission expansion. Once the areas have been identified it would follow that conceptual transmission plans to facilitate the environmentally sensitive development of the most cost effective renewable resources be assembled. This led the WGA to its affiliate organization, Western Interstate Energy Board, to put together a proposal asking the Department of Energy to provide the funding and technical support for Western renewable energy's own project to accomplish those tasks.

The WGA is pleased that the DOE supports this project. We're especially pleased to have the opportunity to work in cooperation with the DOE to accomplish the project goals. By identifying the most developable renewable resource zones throughout the Western Interconnection, load serving entities, transmission providers and State regulators will be able to make more informed decisions about the costs of renewable power, the optimum transmission needed to move renewable power to consumers and which entities might have the potential to form partnerships for developing transmission to access renewable energy.

By promoting a regional perspective we can blunt the potential balkanization of renewables markets while respecting each states primary jurisdictions siting generation and transmission facilities. We can pave the way for interstate collaboration on the permitting of multi-State transmission lines and more equitably allocate and recover the cost of new transmission.

We intend to accomplish this through the inclusive stakeholder process. Governors from the United States and Mexico, Canadian premiers, public utility commissioners and our Federal partners have the responsibility of leading the project. All sizes and types of utilities, transmission companies, environmental organizations, State energy officials and regulators, renewable energy development companies and the Department of Energy and other Federal agencies will have the responsibility of recommending to these western leaders which areas in the Western Interconnection get to be identified as renewable energy zones.

I should mention that this project will incorporate and regionalize the current renewable energy zone efforts underway in Cali-

fornia, Nevada and Colorado. At the end of this process we'll have a series of maps that clearly show where high quality zones exist and a broad based consensus on how they can be effectively developed and connected to the transmission grid.

The WREZ project had its kick off meeting in Salt Lake on May 28. We're planning to complete the mapping and conceptual transmission work over the next 12 to 18 months. Once that is completed we will spend another 12 to 18 months promoting coordinated procurement of renewables and interstate cooperation to facilitate the permitting and construction of transmission lines to the favorable zones.

The project will not have reached its goal until we see the renewable energy facilities and transmission capacity developed. We believe the WREZ will also ultimately serve as a model for any region interested in promoting the rapid and responsible expansion of clean and diversified energy. The WGA believes this process is critical to increase development of clean and diversified energy and the transmission expansion that must accompany such development.

We look forward to sharing the results of our work with the committee and other interested parties. Thank you for providing me with the opportunity to talk with you about the WREZ. I'm happy to answer any of the committee's questions.

[The prepared statement of Mr. Halvey follows:]

PREPARED STATEMENT OF RICHARD HALVEY, WESTERN GOVERNORS' ASSOCIATION, DENVER, CO

Thank you Mr. Chairman and members of the Committee. My name is Richard Halvey. I am the Energy Programs Director at the Western Governors' Association. I am also the project manager for the Western Renewable Energy Zones, or WREZ, project.

In 2004 the Western Governors resolved to increase the amount of clean energy in the electricity generating portfolios of the Western states. To do that they created the Clean and Diversified Energy Advisory Committee. In 2006 the advisory committee provided the governors with a series of recommendations on how best to achieve increased clean energy generation, including how to expand renewable energy resources. The advisory committee recommendations made it clear that while there are many incentives that can stimulate renewable energy growth, perhaps the most critical obstacle renewable energy faces is the availability of transmission. In many cases high quality renewable resources are in remote areas where transmission does not exist, and we all know building new transmission can be both a costly and lengthy, if not controversial, process. For the past two years the WGA, in collaboration with many of the key players from the renewable, regulatory, environmental, and utility sectors, considered how best to address the issue of transmission availability to accommodate renewable energy development.

The idea that generated the most enthusiasm was to identify those areas in the Western Electricity Interconnection that have the greatest commercial potential for development based on a number of factors: the quality of the renewable resource, environmental characteristics, and the costs of plant construction and transmission expansion. Once the areas have been identified, it would follow that conceptual transmission plans to facilitate the environmentally sensitive development of the most cost-effective renewable resources be assembled. This input led the WGA and its affiliate organization, the Western Interstate Energy Board, to put together a proposal asking the Department of Energy to provide funding and technical support for a Western Renewable Energy Zones project to accomplish those tasks. The WGA is pleased that DOE supports the project, and we are especially pleased to have the opportunity to work in cooperation with the DOE to accomplish the project goals.

By identifying the most developable renewable resource zones throughout the Western Interconnection, load-serving entities, transmission providers and state regulators will be able to make more informed decisions about the costs of renewable power, the optimum transmission needed to move renewable power to consumers, and which entities might have the potential to form partnerships for developing

transmission to access renewable energy. By promoting a regional perspective, we can blunt the potential balkanization of renewables markets while respecting each state's primary jurisdiction in siting generation and transmission facilities. We can pave the way for interstate collaboration on the permitting of multi-state transmission lines and more equitably allocate and recover the costs of new transmission.

We intend to accomplish this through an inclusive stakeholder process. Governors from the United States and Mexico, Canadian Premiers, public utility commissioners, and our federal partners have the responsibility of leading the project. All sizes and types of utilities, transmission companies, environmental organizations, state energy officials and regulators, renewable energy development companies, and the Department of Energy and other federal agencies will have the responsibility of recommending to these Western leaders which areas in the Western Interconnection should be identified as renewable energy zones. I should mention that this project will incorporate and regionalize the current renewable energy zone efforts underway in California, Nevada, and Colorado.

At the end of this process we will have a series of maps that clearly show where high quality zones exist, and a broad-based consensus on how they can be effectively developed and connected to the transmission grid. The WREZ project had its kickoff meeting in Salt Lake City on May 28. We are planning to complete the mapping and conceptual transmission work over the next 12-18 months, and once that is completed, we will spend another 12-18 months promoting coordinated procurement of renewables and interstate cooperation to facilitate permitting and the construction of transmission lines to favorable zones. The project will not have reached its goal until we see the renewable energy facilities and transmission capacity developed.

We believe the WREZ will ultimately serve as a model for any region interested in promoting the rapid and responsible expansion of clean and diversified energy. The WGA believes this process is critical to increased development of clean and diversified energy and the transmission expansion that must accompany such development. We look forward to sharing the results of our work with the Committee and other interested parties. Thank you for providing me with the opportunity to talk with you about the WREZ project.

The CHAIRMAN. Thank you very much.

Mr. Freeman, go right ahead.

STATEMENT OF BRYCE FREEMAN, WYOMING INFRASTRUCTURE AUTHORITY, CHEYENNE, WY

Mr. FREEMAN. Thank you, Mr. Chairman, Senator Domenici, members of the committee. I'm delighted to appear before you today on behalf of the Wyoming Infrastructure Authority, particularly in the presence of my Senator, Senator Barrasso from Wyoming. Now the WIA was created in 2004 by the Wyoming legislature at the urging of Governor Dave Fredenthal to diversify and expand the State's economy through the development of electric transmission infrastructure.

In 2006 the legislature expanded our role to include advanced coal technologies. In keeping with the spirit of today's hearing I'd like to highlight some of the challenges that we're facing in developing transmission infrastructure in the West. Offer a few suggestions that you might consider in helping us overcome those challenges.

I want to begin by saying that if the market alone was sufficient and operating properly there would be no need for me to appear here today. But there is uncertainty in this market. Uncertainty that you are all aware of based on a number of issues including climate change legislation, fuel diversification requirements and the difficulties associated with siting new energy facilities.

As a member of the WIA Board and as Wyoming's utility consumer advocate I am concerned about the future availability and affordability of energy resources. In today's uncertain environment

many traditional generating resources have increasingly limited application due to environmental impacts. The reality is that new alternative forms of generation are not yet commercially viable.

That said. No matter what generation resources we use in the future, transmission infrastructure will almost certainly be needed to deliver those choices to customers. We should accelerate the construction of those facilities now.

Through public/private partnerships the WIA has been working on transmission projects over the last 4 years that will allow Wyoming's abundant, low cost energy resources to be delivered to markets where they are needed. Wyoming has one of the highest quality and most prolific wind resources in the lower 48 states. With pending carbon legislation, increasingly stringent renewable portfolio standards and growing loads throughout the West there is an urgent need to bring this resource to market in the near term.

A case in point is the Wyoming-Colorado Intertie. It is a project that will access up to 900 megawatts of Class six and seven wind in Eastern Wyoming and deliver it to Colorado and the Denver market. It is only the second project, to the best of my knowledge, that will use an open season auction process to allocate capacity on the project.

Now the Trans-West Express Project is designed as a 3,000 mega watt direct current line that will originate in South Central Wyoming and terminate at a point just South of Las Vegas, projected to be in service in 2015. On this line we are exploring the use of an anchor tenant approach to assist in attracting development capital for the line. If approved by the FERC this would be the first time that an anchor tenant approach has been used to further transmission development that I'm aware of.

Together with our development partners, Wyoming has enjoyed much success over the last 4 years. There have also been many challenges along the way. While these challenges are not insurmountable, we would welcome Congressional assistance in a few specific areas.

One of our biggest challenges is convincing load serving utilities whose customers would be expected to pay for this new transmission capacity that transmitting intermittent renewable resources over long distances is economically viable. We believe that the cost of capital financing for these transmission projects could be reduced through the use by State authorities of federally, tax exempt finance. This would provide incentives for developers and investors and could significantly reduce cost to customers. We need Federal legislation to put this tool in place.

Second, we are developing and deploying innovative business models in our approach to building transmission and as we do that we will certainly be looking to the FERC to be receptive to these experimental models.

Mr. Chairman, thank you for the opportunity to appear here today. Our focus remains on utility consumers. We should not forget that at the end of the day they're the ones that will be expected to pay the freight for the policy decisions that we make. These transmission investments will almost certainly find their way into consumers' utility bills in the long run. We should be square as

Governor Fredenthal reminds us with utility consumers about the true cost of these investments.

But there is a cost associated with inaction. It could end up being a lot more than the transmission investments that we're talking about. With that, I'd be happy to answer any questions.

[The prepared statement of Mr. Freeman follows:]

PREPARED STATEMENT OF BRYCE FREEMAN, WYOMING INFRASTRUCTURE AUTHORITY, CHEYENNE, WY

Good morning Mr. Chairman, Ranking Member, Senator Barrasso from my home state of Wyoming, and members of the Committee. My name is Bryce Freeman. I am the Administrator for the Wyoming Office of Consumer Advocate and also serve on the Board of the Wyoming Infrastructure Authority. In both capacities, I am appointed and serve at the pleasure of the Governor of Wyoming. I am delighted to appear before you this morning on behalf of the Wyoming Infrastructure Authority.

The WIA was created in 2004 to diversify and grow the state's economy through the development of electric transmission infrastructure. If the market alone was sufficient, there would be no need for an entity such as the WIA to exist. However, in light of the uncertainty that presently exists in the electric industry, the WIA was created by the Wyoming State Legislature to promote transmission and advanced generation development in the state and throughout the region.

The Legislature provides the WIA with bonding ability and other powers, and the WIA participates in planning, financing, constructing, developing, acquiring, maintaining and operating electric transmission facilities and their supporting infrastructure.

The topics for this hearing are the challenges and possible solutions in developing transmission for renewable electricity resources. For the past four years the WIA has been in the forefront of these very issues, and I look forward to sharing with the Committee some of our transmission projects and cutting-edge business models employed to get lines built to facilitate the expansion of renewable resources in the West.

In keeping with the theme of today's hearing I would like to highlight some of the challenges that we are facing in the West regarding transmission development and offer some suggestions that you might consider in helping us and other western states to overcome those challenges.

As a consumer advocate I am both personally and professionally concerned about the future availability and affordability of energy resources. In today's uncertain environment many traditional generating resources have limited application due to adverse environmental impacts, but new alternative generation resources are not yet commercially viable. But, no matter what the future holds in the way of new generation resources, it is certain that new transmission infrastructure will be needed to facilitate those choices.

Through public/private partnerships the WIA has been working on transmission projects over the last four years that will enable Wyoming's abundant, low-cost resources to be delivered to markets where they are needed. Wyoming has one of the highest quality and prolific wind resources in the lower forty-eight states. (See Appendix I). With pending carbon legislation, increasingly stringent renewable portfolio standards, and growing loads throughout the west, there is an urgent need to bring this resource to market in the near term.

BACKGROUND ON THE AUTHORITY

Wyoming has very abundant, diverse energy natural resources, including: wind, coal, oil, natural gas and uranium. For many years Wyoming has had an objective to add value to the extraction of these resources—particularly wind and coal—by generating electricity and shipping the power to growing markets throughout the west.

In 2004, under the leadership of Governor Dave Freudenthal and then-Governor Mike Leavitt of Utah, the region completed a year-long planning process to better understand the opportunities for producing power in the rocky mountain region and shipping that power to western markets. This Rocky Mountain Area Transmission Study (RMATS) produced a regional consensus that, if new transmission lines could be sited and built, the benefits of accessing Rocky Mountain resources would translate into lower costs for consumers and a more diverse resource mix in the western interconnect. The RMATS study also pointed out a number of institutional challenges that at the time were impeding the development of transmission lines.

In response, the Wyoming Legislature created the Infrastructure Authority in 2004, charging it with the challenge of furthering the recommendations of the RMATS report. At the heart of the WIA's mission is to diversify and grow the state's economy through the development of electric transmission infrastructure. The Authority may issue revenue bonds to help finance these facilities, including the ability to extend up to $1 billion of these bonds to the private sector.

Since the formation of WIA, six states have created transmission authorities along the Wyoming model, including: Colorado, Idaho, Kansas, New Mexico, North Dakota, and South Dakota. We are working closely with most of these states on both legislative and project initiatives.

WIA'S CURRENT TRANSMISSION PROJECTS

The WIA was created as an innovative problem-solving organization and our approach to transmission development reflects our innovative roots.

Wyoming-Colorado Intertie

The growing electric markets most proximate to Wyoming in the western interconnect are the city of Denver and the rapidly growing communities along the Front Range. In 2005 the WIA entered into a development partnership with TransElect, an independent transmission company, and with the Western Area Power Administration (WAPA), to explore the commercial viability of a transmission line from eastern Wyoming to the Denver area.

We have now completed the feasibility, technical, and corridor studies for a line that would be designed as a 345 kV facility from the Colorado substation of Pawnee north to the Laramie River Station (LRS) in Wyoming, with a potential segment at 230 kV from LRS to the Dave Johnston coal plant further north in Wyoming.

We are now in the middle of a very exciting and possibly precedent-setting process by offering capacity in the line to third parties using a FERC-sanctioned open season and auction. The bidding application and credit approval steps have been finalized and the list of qualified bidders has us very optimistic that the auction will successfully allocate the capacity. The bidding process began this week; the results of the auction are scheduled to be announced on August 4.

What may make this open season precedent setting is that most of the bidding activity is from parties that want capacity in the line to support their development of wind power farms in eastern Wyoming. For example, the Wyoming Colorado Intertie is a project that will access up to 900 megawatts of class six and seven wind in eastern Wyoming and deliver it to the Colorado front-range beginning in 2013. It is only the second project I am aware of in the west to employ an open season auction as means of committing capacity on the project.

TransWest Express

The TransWest Express project is designed as a direct current line originating in south central Wyoming, with a route through Utah that terminates at a point just south of Las Vegas. As designed, the project would allow 3,000 megawatts of new generation to develop in Wyoming and reach markets in the desert southwest, including Las Vegas, Phoenix and southern California. The goal is to bring this line into service in 2015.

The TransWest Express concept was first explored by Arizona Public Service (APS), a large load serving entity for the very rapidly growing Phoenix area. APS published a promising feasibility study in 2006.

The WIA entered into a development partnership to further the development of this project by joining with APS and with NationalGrid, an independent transmission company. Subsequently the three development parties entered into an interim co-development agreement with PacifiCorp, and work on the project has been coordinated with PacifiCorp's proposed Gateway South project. The two projects would likely share common corridor along much of the route, and applications for federal permits are pending for both projects.

Marketing efforts led by NationalGrid to secure commitments to the line from load serving entities have not been successful due to a number of factors. As such, we are now exploring the use of an anchor tenant approach to subscribe the capacity of this line in order to assist in the attraction of development capital. If approved by FERC, this would be the first time that the anchor tenant approach has been used to further the development of a transmission line. I am optimistic that we will successfully realign the project with a new partnership, likely including anchor tenant commitments from large wind developers interested in building wind farms in Wyoming and shipping the power to hungry renewable markets in the desert southwest.

High Plains Express

We are also actively engaged in the development of the High Plains Express project which is a double circuit 500 kV AC line linking Wyoming, Colorado, New Mexico and Arizona. A feasibility study was completed in 2007, and the project sponsors are currently working on an agreement to further the development. This project is a longer-term opportunity, with a planned in-service date of 2017. The sponsors include TransElect, an independent transmission company; six utilities (Tri-State G&T, Colorado Springs Utilities, Public Service Company of New Mexico, Salt River Project and Xcel Energy); three States with transmission authorities (Colorado, New Mexico and Wyoming) and the WAPA.

See Appendix II for more details on WIA's three pending transmission projects, including depictions of conceptual routing.*

Regional Challenges and Solutions

While the WIA has been focused on the economic development opportunity available to Wyoming, we recognize this is part of a bigger regional picture. The western interconnect has a number of features that make it unique, and these regional characteristics and challenges will need tailored solutions.

The western electric interconnected system is a vast synchronized machine involving eleven states, two Canadian provinces and parts of Baja, Mexico. There are very long distances and very significant land holdings controlled by federal agencies and Native American tribes. With the exception of California and Alberta, there is no regional system operator or transmission organization to manage congestion, build transmission, and broadly allocate costs. The west is dominated by vertically integrated utilities serving balkanized service territories, with many functional control areas. The largest and highest quality renewable resources are typically not located close to the cities where the demand is highest. This is especially true with wind resource potential. As this committee clearly recognizes by holding this hearing, transmission infrastructure is the critical linchpin to successfully developing and integrating renewable electric generation in the West.

Together with our development partners, we have enjoyed much success over the last four years. We have also encountered many challenges. We don't see any of those challenges as insurmountable but we would welcome your assistance in a few specific areas.

Tax-exempt Bonding by State Authorities

One of our biggest challenges is convincing the load serving utilities whose customers would pay for the transmission capacity that transmitting intermittent renewable resources over long distances is economically viable. We believe that reducing the cost of capital financing through the State Authorities' use of tax-exempt bonding would provide a significant incentive to developers and investors and lower costs to consumers.

We need federal legislation to put this tool in place. For the past few years, in common cause with the other states that have created transmission authorities, we have been working with the Senate Finance Committee toward language that would in a limited way allow tax-exempt bonds to be used by these authorities. The language, which is included in the tax title to the Senate energy bill that is stalled in this Congress, would allow State transmission authorities to utilize—within each State's existing volume cap—tax-exempt industrial development bonds.

FERC Needs to Allow Experimental Business Models

The WIA and its partners are deploying innovative business models on our transmission projects. Especially in the West, with some of its characteristics summarized above, I believe we need to stretch beyond the vertically integrated utility ownership and control of transmission facilities. The FERC sanctioned process that governs transmission service requests is cumbersome at best. The WIA has worked to include independent transmission companies in our partnership mix for this very reason. We have also embraced innovative development tools, such as open seasons and anchor tenant models, to stretch past some of these institutional sticking points. We will ultimately be looking to FERC to be receptive to approving these experimental models.

National Interest Corridor Designations

The Energy Policy Act of 2005 created a back-stop siting protocol that could become a critical tool for facilitating the siting and permitting of transmission lines to facilitate renewables. We believe that there is a significantly expanded role to be

* Project maps have been retained in committee files.

played by the DOE in identifying and designating prospective National Interest Electric Transmission corridors. Together with the WGA's recently announced Western Renewable Energy Zone initiative this would significantly enhance our ability to identify and develop low cost, high quality renewable energy resources in the west.

CONCLUSION

In closing Mr. Chairman, let me again thank you and the Committee for the opportunity to appear here today and let me reiterate that my focus remains on utility consumers. We should not forget that at the end of the day they are the ones who will be expected to pay the freight regarding the policy decisions of federal, state and local policy makers. We have an obligation to serve their interests to the best of our ability. I believe that the transmission development work that the WIA is engaged in supports that high public interest standard. These investments will eventually find their way into utility bills that customers pay and, as Governor Freudenthal reminds us, we should be square with utility consumers about the cost of these investments. There are, however, costs associated with inaction. Those costs are real and in the long term could prove to be much higher than the costs of the transmission investments I have discussed today. With that I would welcome any questions you might have.

APPENDIX I.—WYOMING'S ABUNDANT WIND RESOURCE

- According to NREL, Wyoming has over 2/3 of the Class 7 and over 1/2 of the Class 6 "developable" onshore wind in the U.S. In addition, Wyoming has more Class 5, 6 and 7 developable wind than all western states combined.
- NREL data reflects "developable" Class 5 and higher wind potential for the State is in excess of 100,000 MW's and Class 3 and higher wind potential in excess of 500,000 MW's (see attached spreadsheet). To provide some relativity to those numbers, the peak demand for the entire WECC grid is estimated to be 175,000 MW's.
- Over the last eighteen (18) months, the WIA has been actively identifying generation projects in support of the six (6) transmission projects in the State. To-date, we have identified over 20,000 MW's of wind generation projects; nearly 2,000 MW's of natural gas-fired projects and 110 MW's of power relative to a planned coal-to-liquids facility. These projects represent possible future power which is currently un-dedicated. The capacity factors of the wind projects identified range from 35% to 50% with a weighted average in excess of 43%.

[Wyoming Wind Map has been retained in committee files.]

APPENDIX II.—SUMMARY OF WIA'S TRANSMISSION PROJECTS UNDER DEVELOPMENT

1. Wyoming-Colorado Intertie Transmission Project (WCI)

- New 345 kV AC Transmission line between Wyoming and the Front Range of Colorado delivering wind generation in Wyoming to Colorado
- Capacity: 900 MW
- Length: 180 miles
- In-service Date: 2013
- Cost: < $300 Million
- Developers: Trans-Elect; Western Area Power Administration; Wyoming Infrastructure Authority
- WECC Path Rating Process: Phase I complete; currently in Phase II
- ROW & Permitting Status: Waiting on the awarding of capacity via Open Season
- Status:
  —FERC-sanctioned Open Season is underway with a start date of 3/31/2008
  —Project has been entered into the WECC, CCPG regional planning group
- Business Model, re: Market(s): LSE's in Colorado
- Complementary Projects:
  —High Plains Express
  —PSCo's expansion of their system in N/E Colorado
- Links: http://www.wyia.org/wci

2. TransWest Express Transmission Project (TWX)

- New 500 kV DC line between Wyoming and Las Vegas
- Capacity: 3,000 MW
- Length: >800 miles
- In-service date: 2015

- Cost: >$2.5 Billion
- Developers: As of March 2008, the participants were National Grid (lead developer); Arizona Public Service; PacifiCorp; and Wyoming Infrastructure Authority (WIA). Currently, the participants are being redefined.
- WECC Path Rating Process: Phase I
- ROW & Permitting Status: Formal application has been filed with the BLM in 2007; RFP for 3rd party contractor for NEPA compliance has been issued. Working; and a common EIS with GWS has been tentatively required by the BLM
- Status:
  —Project is being co-developed with the GWS project to mitigate costs
  —Initial feasibility studies completed;
  —Other utilities are interested in participating including Salt River Project, Tucson Electric Power, and Southern California Edison
  —Stakeholder meetings have been held in Utah, Wyoming, Arizona and Nevada
  —Actively involved in the identification of generation developers to support the project
  —Project has been entered into the WECC, NTTG regional planning group
- Business Model, re: Market(s): LSE's in Arizona, Nevada and Southern California
- Complementary Projects: see Gateway South project below. Also:
  —Palo Verde—Devers #2—500 kV line (on hold)
  —EOR 9300 Project
  —Palo Verde—North Gila #2—500 kV line
  —Gateway West—2 500kV lines
  —Gateway South
  —Mona-Terminal—2 500 kV lines
  —Populus-Terminal—2 345 kV lines
- Links: http://www.wyia.org/projects

3. High Plains Express Transmission Project (HPX)

- New 500 kV AC transmission lines between Wyoming and Arizona with on-ramps and off-ramps in Colorado and New Mexico and related facilities
- Capacity: 3,500 MW
- Length: 1,280 miles
- In-service Date: 2017
- Cost: >$5 Billion
- Developers: Trans-Elect Development Company; Western Area Power Administration; and Wyoming Infrastructure Authority; Tri-state G&T; Colorado Springs Utilities; Public Service Company of New Mexico, Salt River Project; and Xcel Energy (Public Service Co of CO); New Mexico Energy, Minerals and Natural Resources Department; New Mexico Renewable Energy Transmission Authority; and Colorado Clean Energy Development Authority
- WECC Path Rating Process: Project is scheduled to enter the Phase I process in 2009
- ROW & Permitting Status: Some activity is scheduled to occur in late 2009
- Status:
  —Feasibility studies continuing
  —Executive committee has been formed to transition the oversight of the development process from the planners
  —Project has been introduced into the WECC, CCPG and SWAT/West Connect regional planning groups
- Business Model, re: Market(s): LSE's in Colorado, New Mexico and Arizona
- Complementary Projects:
  —WCI Project
  —Eastern Plains Project
  —New Mexico Wind Collector (Path 48)
  —Sun Zia Project
- Links: http://www.rmao.com/wtpp/HPX—Studies.html; http://www.tristategt.org/RP/Transmission.cfm; http://www.wyia.org/projects

The CHAIRMAN. Thank you very much. We've been joined by the Majority Leader, Senator Reid. Let me just reiterate what I said at the beginning of the hearing and that is that Senator Reid is one of those who urged us to have this hearing because of the importance of this issue in his view.

He's also introduced S. 2067, which tries to confront probably the most difficult issue here related to building more transmission. That is cost allocation. So Senator Reid, go right ahead with any comments you have.

STATEMENT OF HON. HARRY REID, U.S. SENATOR FROM NEVADA

Senator REID. Mr. Chairman, thank you very much. Members of the Committee, I appreciate your allowing me to speak. The Senate went in session at 10 o'clock and I had to get started there. I apologize for being late to the hearing.

I also am happy to be on the panel with these respected witnesses, especially Mr. Pickens. I, without his permission, talked about you on the Senate Floor today. I said that the great American entrepreneur T. Boone Pickens knows a lot of things. But one is how to make money. If he's interested in renewable energy, we all better start taking a look at it.

[Laughter.]

Mr. PICKENS. Thank you.

Senator REID. I also say to you, Mr. Pickens, that for many years one of your biggest cheerleaders has been Michele Lacksalt, who's of course from Nevada and my long time friend. So glad to be on the panel with you.

Mr. PICKENS. Thank you.

Senator REID. Our Nation has many grave challenges that have gone unaddressed for far too long. Chief among them is global warming which is closely connected to our growing energy and economic security problems. Fortunately the most abundant form of energy in the United States and across Earth, renewable energy, the wind, the sun, the heat of the Earth, biomass and water is the solution that works best to meet all these challenges.

It works best to grow our economy in a sustainable way, create new jobs and to leave a legacy for our children we can be proud of. One we wouldn't mind having in our own backyards today. That's a better legacy than leaving piles of dangerous waste, dirty air, threatened water supplies or dangerously warmer world for generations to come.

Unfortunately the Nation has been fixated on easy answers of throwing billions and billions of tons of carbon waste in the atmosphere. We've been taking this carbon out of the Earth and putting it into the atmosphere for far too long. Fixated on short term profits and not investing enough in renewable energy.

That's really unfortunate, because from the moment the Senate ratified the United Nations Framework Convention for Climate Change in 1992, industry should have been on notice of cost effective, low carbon solutions need to be found and invested in right away. But most of the momentum in the utility industry to invest in renewable generation has come because of State's passing renewable portfolio standards.

Right now 25 States and the District of Columbia have a renewable portfolio standard. Many were created over the objections of local utilities. These States understand the potential for new jobs and the long term cost advantage of renewable over increasingly expensive fossil fuels.

Just think about this. If 20 percent of the Nation's power came from renewable energy by 2020 which happens to be the same standard in Nevada, but for 2015, we would create at least a couple hundred thousand new jobs and actually save consumers more than $10 billion in lower electricity and natural gas bills.

Some leaders in the utility industry are slowly waking up to the value of investing in energy efficiency and renewables. But some persist in thinking that we have the luxury of going backward to the old, inefficient fossil fuel use of the past. Mr. Chairman, we have on the Senate Floor a piece of legislation that would give tax credits for renewables. We're going to try and get closer on that today at 2:15.

I read into the record a few minutes ago a letter we received yesterday from the major companies in America, major companies, hundreds of them. MERCK, Commons Diesel, Coca Cola, hundreds of major companies saying please, democrats, republicans, vote for this. It's essential to the survival of our country.

We don't have the luxury. We need not go backward. We have to get away from persisting and thinking we can go backward to the old, inefficient fossil fuel use of the past.

Rapid investments now in a combination of efficiency, renewable energy and a smart and more flexible and reliable electricity grid can meet the power demands of this country for the foreseeable future, affordability and cost effectively. Every Senator has heard me say this before, but it bears repeating. A 100-mile-square area of Nevada, take the Nevada test site. That would be part of our test site or really anyplace in the desert southwest. There are well over 100 square mile areas. There's nothing on them except sun shining every day can meet the entire Nation's electricity demand, a solar PV and the right transmission infrastructure.

Think about that. One spot in the southwest could supply electricity for all of America. The total solar thermal potential in the southwest could generate seven times U.S. current electricity capacity.

Despite 25 States with a renewable portfolio standard, the Federal Government has been very slow to embrace renewable energy instead preferring the older, dirty and more expensive sources. Neither the Federal Government nor the utility industry has invested enough to integrate the growing renewable energy asset into the grid. overall the sluggish pace of transmission investment by utilities has left us with a brittle and insecure power grid.

Mr. Chairman, I can remember a dozen years ago, I was in a place called Gerlock, Nevada about 90 miles above Reno. I went to look at a generating plant powered by the steam that comes out of it. You see it coming out of the ground around there. Power plant. Geothermal.

I said to the man, this is nuts. Why is it so small? He said well, I'm just using it to take care of the mine up here in Gerlock. He said, see that power line over there. You could see it was three quarters of a mile away. You could see it.

He said for me to have a big plant here it would cost me $175 million to tie onto that power line. Now I don't know if he was right. But that's what he told me. But that's a problem we have, Mr. President. It's one of the problems we have.

Overall the sluggish pace of transmission investment of utilities has left us with a brittle and insecure power grid. Even the Department of Defense is concerned about grid security now. Unfortunately nationwide investment in transmission declined for 2 years, I'm sorry, for two decades. Let me say that again. Unfortunately nationwide investment in transmission declined for over two decades.

By 1998 companies spent less than half of what they did in 1975. At the same time electricity sales doubled. Prices have risen. Consumer demand continues to grow.

Recently utilities have begun to increase their transmission investment but they're far, far behind the curve. A new and significant amount of investment must occur. This will not be easy given the incredible backlog. It will not be cheap because instead of making gradual improvements over the years industry has waited until now.

The Brattle Group estimates the Nation will need $900 billion for distribution and transmission by the year 2030. But that investment must be smart. By smart I don't mean simply linking existing and highly inefficient coal plants by Federal energy corridors. That investment and those corridors must accommodate mainly new generation from renewables if we're serious about addressing global warming.

I have, as you've indicated Mr. Chairman, introduced legislation that tackles several of the obstacles to new investment in renewable electricity transmission. I believe it's time for the Federal Government to take a much more constructive role, particularly since industry has not risen to the challenge. My bill, S. 2076 directs the President to identify and designate zones where renewable energy resources can generate at least 1,000 megawatts of electricity. It would then provide new financing options for building transmission lines and connecting remote renewable energy zones to the grid.

After designation, the Federal power marketing agencies, like the Western Area Power Administration, would have a year to identify new transmission lines needed to access renewable power in these zones. If no private companies invest within 2 years, the Federal agencies would each have $10 billion in bonding authority to finance those power lines. These lines would carry mostly clean, renewable energy, particularly if they cross Federal land.

We need new sources of energy that don't add more global warming pollution. Renewable energy companies cannot always afford to pay up front for new transmission lines and the cost of connecting to them as I give in one example. My bill would help change this.

Renewable project and transmission developers would pay back the federally financed lines, a cost over 50 years. But the bill also clarifies FERC should let transmission utilities recover prudently incurred costs for intrastate, high voltage lines and allow for a systems charge in intrastate trunklines which declines as more renewable projects are added. Existing power market agency customers would not be liable for the cost of renewable project interconnection.

Utility executives like to say that we can't afford to build transmission lines that carry only or mainly renewable generated electricity. They like to say it just doesn't pencil out. But if they say

that, I just don't think that they really tried very hard to crunch those numbers.

This is particularly relevant when you look at the declining cost curve for renewable energy technologies and the rising costs of fossil fuels. Even without a carbon constraint we know that within the past year coal has gone up 100 percent. It's doubled the price.

Cost is an issue, but it's not an excuse for inaction. As Senators know the utility industry is not noted for its agility or flexibility. This is a function of the service it provides.

Americans want reliable and affordable electricity. But to keep the lights on and meet the demand for clean power, America must change. This legislation is a serious effort to find solutions to the challenges of our energy security and global warming problems.

The Federal Government has to add its weight in support to help convince the pencil pushers of the necessity and the cost effectiveness of investing in renewables. The Federal Government needs to be a better partner.

The West will need 7,500 miles of new transmission lines over the next decade to significantly expand renewable energy production. The Western Governors' Association, the States of Nevada, Texas, Oregon, Colorado and California are beginning to consider how to connect renewable resources to transmission. This is a responsible action. But their efforts will not be sufficient without more constructive Federal involvement.

Efficiency, renewables and improvements to the grid can more than meet the country's growing electricity demand, but only if utilities don't sit on their hands and under invest allowing a train wreck to occur like we saw in the Northeast blackout in 2003 and the Western Energy crisis in 2000–2001.

I would like to ask to include in the record, Mr. President, the executive summary of a recent energy foundation study. The study uses as an example Nevada, the seventh largest State in the Union, area wise, as a case study and contains a solid road map for meeting growing demand without using old technology. It emphasizes the need for greater efficiency. But also the urgent need for renewable transmission capacity.

[The information referred to follows:]

LAYING A FOUNDATION FOR NEVADA'S ELECTRICITY FUTURE: GENERATION FACILITY UNCERTAINTIES AND THE NEED FOR A FLEXIBLE INFRASTRUCTURE

PREPARED FOR: ENERGY FOUNDATION, SAN FRANCISCO, CA

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Disclaimer: Any opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the Energy Foundation.

Executive Summary

Sierra Pacific Power Company (SPPC) and Nevada Power Company (NPC) recently announced a delay in the operation of the first 750 megawatt (MW) coal unit of the Ely Energy Center (EEC).[1] The Utilities have further suggested that uncer-

[1] 2007. Reuters. "RPT-Nevada Power Delays Ely Coal Power Plant." December 1. Retrieved December 5, 2007 from http://www.reuters.com/article/bondsNews/idUSN3033040220071201

tainties may lead to further delays or cancellation of the coal power plants.[2] While all new sources of generation face uncertainties that can affect the timing and ultimate cost of those facilities, the delay or cancellation of the coal units demonstrates the risk to reliability and rates associated with a strategy that is dependent upon the timely completion of large centralized generation. The potential absence of the 1500 MW EEC coal plants highlights the need for a contingency plan to meet a resource shortfall. This report frames the issues that need to be addressed by such a plan. The intention of this study is to initiate a discussion among the Nevada Utilities and policy makers that will expedite the construction of an infrastructure that accesses distributed and centralized resources from the state and the region. To their credit, Nevada Utilities and Nevada's policy makers have already proposed significant infrastructure additions. The proposal in this report differs from existing proposals because it emphasizes the importance of getting infrastructure in place in advance of the proposed coal plants and it proposes more substantial access to distributed and demand side resources. Building an infrastructure foundation now that leverages and extends existing proposals will provide Nevada Utilities and policy makers with a flexible array of options.

The first cornerstone of a flexible infrastructure foundation for Nevada is a north-south transmission inter-tie. Several north-south interconnections have been proposed, including the Utilities' Eastern Nevada Transmission Inter-tie (EN-ti) proposal.[3] The Renewable Energy Transmission Access Advisory Committee (RETAAC) recently expressed its support for a north-south inter-tie in Nevada and RETAAC highlighted the importance of such an inter-tie to facilitate development of renewable energy in Nevada.[4] Interconnecting SPPC and NPC facilitates reserve sharing, captures system coordination benefits, facilitates development of renewable energy resources in northern Nevada, and provides NPC with access to electricity reserves in the Northwest, Basin and Rocky Mountain regions of the western grid. It fulfills a key promise from the Utilities' merger. Completing a north-south interconnection by 2011 contributes significantly to meeting:

- Nevada's near term needs by providing NPC with access to SPPC excess capacity and regional reserves, and
- Nevada's longer term needs by providing NPC with access to northern Nevada and regional renewable energy projects.

The second cornerstone of building a flexible infrastructure in Nevada is ensuring access to cost effective energy efficiency, demand response and distributed generation resources. The Utilities, Nevada policy makers, and the federal government have all contributed to energy conservation in the state. However, the announced delay in the EEC requires that proposed utility and non-utility efficiency enhancing projects are implemented aggressively and that existing proposals are complemented with additional distribution level measures. Existing demand side management (DSM) and demand response (DR) programs should be accelerated and improved, and combined heat and power (CHP) partnerships between large commercial entities, such as casinos, and the Utilities should be pursued. Completely accounting for all of the energy and demand savings associated with existing utility and non-utility programs in the Utilities' demand forecasts will be just as important as implementing the programs well because documenting reduced consumption contributes directly to meeting resource adequacy requirements.

The third cornerstone is beginning pre-permitting, permitting and construction of renewable energy transmission collector systems on an expedited basis and aggressive pursuit of renewable energy projects that benefit from the selected collector systems. Nevada is poised to be at the national forefront for solar and geothermal resources, and Nevada can begin adding wind power.[5] A review of western planning reports finds that these resources are expected to be cost competitive with traditional gas and coal-fired generation. Nevada is evaluating the alternatives, but in comparison with other western utility planning reports, the Nevada evaluation could be more systematic and comprehensive. SPPC identified routing studies that could facilitate more rapid development of renewable energy resources in northern

[2] 2007. "Nevada Utilities Want to Kill Bill Amendment that May Stifle Coal." California Energy Markets. December 7, p. 15.

[3] NPC. Integrated Resource Plan 2007-2026. Vol. 6, Supply Side Plan , Transmission Plan and Financial Plan, pp. 87—93.

[4] RETAAC. Phase 1 Report. December 2007, p. 6.

[5] NPC. "Renewable Energy," http://www.nevadapower.com/company/renewables/, retrieved January 30, 2008.

Nevada in its most recent Integrated Resource Plan (IRP).[6] Yet the Utilities' "Preferred Portfolios" continue to focus on gas and coal resources and downplay the potential for these resources to meet its needs.[7] To its credit, RETAAC identified and is refining plans for transmission collector systems statewide that could facilitate the development of renewable energy zones in Nevada[8] Improving access to resource alternatives as technology, resource discoveries and availability of capital equipment evolve is an essential cornerstone to laying a flexible infrastructure foundation. Utility and RETAAC efforts are encouraging but delays in the EEC justify expedited development of the most promising collector systems and initiating specific request for proposals (RFPs) that can attract a set of projects to fill possible collector system zones prior to 2013.

The fourth cornerstone complements the first three and includes building flexible gas generation capabilities. NPC has announced that it will ask for approval of an additional 500 MW unit at the Harry Allen site. The utility is to be congratulated for having a pre-permitted site that can be accessed quickly, however, the generation built should be considered relative to its efficiency and thus CHP applications should be considered alongside any new proposed gas plants.[9] In addition, the generation considered should also be evaluated based on its ability to support a Nevada generation fleet that will have more intermittent generation and more distributed and demand side generation in the near future. Finally, construction of gas storage facilities should be considered alongside the consideration of new gas generation so that flexible gas contracting can increase the Utilities' flexibility in how it dispatches its existing and planned gas generation fleet.

Nevada's long term resource needs will require an infrastructure foundation that allows NPC and SPPC to access local, state and regional resources. Federal and state policies, regulations and tariffs that facilitate the construction of and access to Nevada's flexible infrastructure can be developed and implemented. The first delay in the EEC has created a need for additional resources by 2011. Additional uncertainties surrounding the future development of the EEC cited by Sierra Pacific Resources (SPR) in its 10-Q include possible changes in environmental regulations, emissions limits, climate change legislation and the possibility of increasing plant construction costs.[10] Given these uncertainties, delaying the deployment of the flexible infrastructure needed to access diverse resources would be a serious mistake. Nevada has the opportunity to lay the foundation of a flexible infrastructure now, which will address the near term needs created by this first delay and allow it to flexibly respond to longer term needs as in-state and regional resources are developed.

Senator REID. Mr. President, this is done in a scholarly fashion. You have Dr. Suzanne Phinney, who is a person who has spent her lifetime looking at things like this. She holds a Doctorate in Environmental Science from the University of California, Los Angeles.

Dr. Carl Linvill holds a PhD in Economics from the University of North Carolina where he is now working and on and on with the people that worked on this. All eminently qualified who have had experience, not only in the academic field. But for example, Dr. Linvill was the economic advisor to Governor Gwen when he was Governor of Nevada.

So I hope that the committee will move forward on taking a real close look at transmission lines. That's the key to making this alternative energy a success. I appreciate very much and I apologize to my desk mates here coming in late and testifying. I'm going to have to go back to the floor if that's ok with the chairman of the committee.

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[6] SPPC. 2007 Integrated Resource Plan 2008-2027. Vol. 6, Supply Side Plan, Transmission Plan and Financial Plan, p. 98.

[7] Op. cit., pp. 60-61.

[8] RETAAC. Phase 1 Report. December 2007, p. 9.

[9] Business Wire. "Nevada Power Announces Plan to Build Natural Gas Facility." November 28, 2007. Retrieved November 28, 2007 from http://www.businesswire.com/portal/site/google/index.jsp?ndmViewId= news_view&newsId=20071128006106&newsLang=en.

[10] SPR. Form 10-Q, Quarterly Report, Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations. November 2007. Retrieved on November 4, 2007 from http://biz.yahoo.com/e/071102/srp10-q.html.

The CHAIRMAN. Thank you very much, Senator Reid, for the statement. We will certainly include the report that you referred to as part of the record. We appreciate your strong endorsement of the legislation that you've introduced.

Let me start with our questions. We'll have a 5-minute round of questions here.

Mr. Pickens, one of the points that Senator Reid made is that a significant amount of the progress that has been made in promoting renewables has been because of renewable portfolio standards that have been adopted in 25 states. We've tried to adopt a national renewable portfolio standard and not been successful. What's your view as to the utility of us doing that? Is that something we ought to continue to pursue or does it make a big difference?

Mr. PICKENS. Let me go back to what I consider the problem that I'm trying to attack and that is that we're paying for $700 billion worth of imported oil. So, I then look at what is available to us in this country to, in some way, off set that.

If you go down the list of resources we have available. We have oil, which is in decline. We have coal. We have natural gas. We have wind. We have solar. We have hydro. We have biofuels. Nuclear.

We've got to look at everything. We got to look at everything. The renewables, it's time for the renewables. The wind is located in the right place.

If I could ask one of my guys to put a map, show me the one that the DOE had. This is a great illustration. This is a DOE map that was done in April of 2007. But it shows the wind corridor, that being right up through the central part of the United States.

It's in a perfect place, one, to have safety as to where the location is. It's perfect as far as the people in that area. They want it. They want the wind. It's not like on the coast where you have problems there siting those turbines.

But here they want it. It could happen. I think the Department of Energy did an excellent job of identifying the resource and then also the transmission out of there.

I know you asked me the question about the renewables. Renewables, it's time for the renewables. If you look at the—my second again, Department of Energy map. I look like I don't have any displace here, but I do have some too.

But anyway, get the one on the solar. Here we're very, very close to doing something on solar. You can see here again across the Southwest part of the United States is the solar corridor. This could be put, solar and wind do extremely well together in mixing them.

But what we need is leadership to come forward and develop these resources for us because we are so close now to having them and in quantities that would substantially reduce the $700 billion that we're buying foreign crude oil with. We've got to get that stopped.

The CHAIRMAN. You, in your testimony there, you talked about how we needed to release natural gas out of power generation so that we take what we're currently using in power generation and shift that to the transportation sector. In addition to the renewable

portfolio standard that we've been talking about, are there other actions you think the Federal Government should take to try to insure that the transition of natural gas from power generation to transportation occurs or will the market just bring that about? How do you see that occurring right now?

I think the utilities have generated more and more power from natural gas because that has been the cheapest way to generate additional power. I don't know if the wind generation you're talking about is going to be a more attractive option for them or if we need to have policies in place that cause that shift to occur.

Mr. PICKENS. As we all know in this country that it's going to go to the cheapest, you know, source of power. That's our system that we all operate under. So it's got to go the cheapest. Wind will be cheaper than anything else. Solar will also. Not yet. I'm not saying we're there yet. We are on wind. We're not on solar.

But the natural gas will move out of the power generation slowly. I can see that it moves out and is very conveniently replaced over a period of five to 10 years. So I don't know that I would have any recommendations to you on this other than let it happen. Encourage it to happen.

I think you've got to have a PTC to make it work. You know, you want to go as quick as you can because you want to reduce the 700 billion number. So PTC will, on our evaluation was 200,000 megawatts. The PTC for that would be $15 billion a year to accomplish that. You need to give it a long enough time for planning can happen.

Another point that I'm not sure and this was brought up in a meeting last night that we don't have the manufacturing for the wind and it's GE is big in the business. We have a few other smaller ones, but if we have a PTC that shows the wind manufacturing turbine people, they'll come into the country. We'll have—and that'll bring down the cost. When they come in they'll be more competition and it will bring down the cost there.

But when you look at $15 billion a year, it's insignificant compared to the 700 billion that's going out for foreign oil.

The CHAIRMAN. Alright.

Senator Barrasso.

Senator BARRASSO. Thank you very much, Mr. Chairman. First I'd like to welcome Mr. Bryce Freeman here to the Senate. He's come from Wyoming. He serves on the Wyoming Infrastructure Authority Board. It's an organization that was created with my support when I served in the Wyoming State Senate.

Other states have followed the lead of Wyoming, have set up similar organizations to develop electric transmission infrastructure. Plus Bryce has served for years as the Consumer Advocate to the State's Public Service Commission. So thank you very much for being here.

Mr. FREEMAN. Thank you, Senator.

Senator BARRASSO. There was an article in this morning's Casper Star Tribune under the title, Utility Finds Power Line Foes, which gets to the point of what we're talking about this morning. I'll just read briefly. "It seems like an idea that any environmentalist would embrace. Build one of the world's largest solar power oper-

ations in Southern California desert and surround it with plants that run on wind and underground heat."

Those things you're talking about doing and the things that the map has shown. Yet San Diego gas and electric and its potential partners face fierce opposition because the plan also calls for 150 mile high voltage transmission line. The show downs over how to get renewable energy to consumers will likely play out elsewhere around the country as well.

Providers of renewable power covet cheap land and abundant sunshine and wind in places like West Texas, Wyoming, Montana and Southern California. But utility executives say no one will build plants without power lines to connect those remote spots to the cities. That's the thing that many of you have mentioned.

I guess my question, Mr. Pickens is that Mr. Freeman talked about uncertainty in the market. Now people in this room know that a lot of your success comes from seeing more clearly through that uncertainty than others have been able to do. When you look at this, when you look at the issues of the cost of construction and siting and access to corridors, is one of those a bigger burden than you see than the other?

Is it the cost of the construction? Is it the siting and getting the permission to get through? What are you dealing with?

Mr. PICKENS. The biggest hurdle of course, is to get access to the corridors. Somehow, I mean, I'm not sure how well versed I am on this response. But if we could go the route that Eisenhower used with the Interstate Highway System, I think the issue is so critical, I think we are in an emergency.

I think the outflow of the—I keep saying this, but I want to though, but $700 billion a year. We can't afford that. We're going to be brought to our knees if this continues.

There's no reason to believe that the people with the oil are going to bring the price down. I mean, if we reverse positions and you and I are sitting on the table with the oil and they don't have the oil. We're going to want to sell the oil for the best price we can get for it. I mean, that's just human nature.

They do have a finite resource. They do not have as much oil as they can tell us they do. It isn't there.

I do believe in peak oil. I believe that you have peaked out at 85 million barrels a day globally. Now we're using 21 million barrels of the 85 million and producing about 7 of the 21.

So if I could take just a minute on this point. The demand is about 86.4 million barrels a day. When the demand is greater than the supply, the price has to go up until it kills demand.

That's where we are. That's what we're dealing with. We're killing demand in the United States.

We killed 500,000 barrels a day of demand in the last year. But the Chinese have picked it up is what's happened. We are in a global situation, is what's happened to us.

You know, when we say our truckers in this country and I met with the Swift Trucking Company out in Phoenix 2 weeks ago. They said what's in store for us. I said you're going to pay more for diesel is what's going to happen.

It takes four barrels of oil to make one barrel of diesel. That is becoming more and more expensive. Now I know you're thinking

does he mean you can get one barrel of diesel and throw away the other three barrels. No, that isn't what happened because it comes out of the products.

But diesel is becoming more and more expensive around the world. You look at those truckers over there in France and Turkey and they are parking their trucks and they're frustrated. You know, they're saying we've got to have cheaper fuel.

They do, if they're going to make money at the rates they're charging so that price is going to go up or I don't think they're going to get any cheaper fuel is what's going to happen. So we've got to take care of ourselves. I think if you can open up those corridors for transmission and for renewables. I see the corridors as being for renewables. I think that's very healthy and for the country.

Senator BARRASSO. Thank you. Mr. Freeman, hearing what Mr. Pickens said where he thought that the issue with the siting and the corridors was greater than the cost that was the bigger expense was not the financial cost, but the getting through the corridors. Can you tell us about your experience in Wyoming? What you've learned and what you think we need to do? He had talked about possibly like an Interstate Transportation System.

Mr. FREEMAN. I, Mr. Chairman, Senator Barrasso, I certainly agree with Mr. Pickens with regard to the importance of energy corridors and particularly electric transmission corridors. I neglected to mention in my summary that that is a challenge that we have in the West is—and I think that we're convinced that the Federal Government, particularly the Department of Energy can play a much larger role than they have in the past in identifying and designating national interest electricity transmission corridors. We think, frankly that in combination with the renewable resource zone initiative that the WGA has recently announced that that will significantly enhance our ability to identify and develop low cost renewable resources in the West.

So, I do agree with Mr. Pickens that certainly the corridor issue is first in time to a lot of the other issues because you have to plan those corridors. You have to get the right of way sewed up before anything else can happen. A lot in the West, a lot of those corridors traverse Federal lands.

We've had some difficulty in the past working in an efficient manner with the Federal agencies to try to get transmission facilities sited. It doesn't look like that's going to get any better unless we work on that problem specifically. So corridors certainly are a high priority for us.

Senator BARRASSO. Thank you, Mr. Freeman. Thank you, Mr. Chairman. My time's expired.

The CHAIRMAN. Thank you.

Senator Johnson.

Senator JOHNSON. Mr. Kolevar, in a question that you asked Western Area Power Administration about transmissions like Western power own thousands of miles of transmission lines. How does the DOE envision the PMAs willing to grow in developing wind energy resources?

Mr. KOLEVAR. Thank you, Senator. The PMAs, the Western area Power Administration and Bonneville in particular, already have

substantial authority. Bonneville, in particular can finance lines and in limited circumstances use the power of eminent domain to site those lines. They are constrained by the manner in which they would designate the costs, or a portion of the costs, for those lines across all of the people that utilize that system.

At the end of the day I think both of those power administrations will play a key role in achieving the type of infrastructure system you see on the map right there. That is not our current infrastructure. That really envisions a much larger series of high voltage backbones, including lines that connect the Eastern Interconnection to the Western Interconnection.

Both of the power administrations will play a role in that. In and of themselves, they lack the authority to do that now. I understand that there have been some discussions.

Senator Reid's bill speaks to the manner of which they might bolster those authorities. I understand that there are advocates as well as those that oppose within their customer base. So I think there is a lot of room for discussion on this involving those customers who are very concerned about the way the costs of any new lines would be borne by them when the benefits might be realized by someone else.

Senator JOHNSON. I yield.

The CHAIRMAN. Senator Smith.

Senator SMITH. Thank you, Mr. Chairman. Mr. Pickens, thank you for being here. We're honored to have you here. I wonder if in your vision in terms of the transmission generation by wind, how much investment is needed? Do you think that private capital is available for this transmission?

I ask that question because I think the difference, as I understand it, between your bill and Senator Reid's is your talking about private capital investing in the transmission. I think he's talking about public investment in that transmission.

Mr. PICKENS. Let me give you a number and I'm going to check it and then come back to you on it. Ok? For the 200,000 megawatts that I had our guys look at and say, well, you know, my question was the same as yours. What's this going to cost to move 200,000 megawatts wherever it's going to go?

I believe that number was $70 billion. All the numbers that we keep coming up with are so miniscule compared to what we're paying for foreign oil that it almost, you know, when you think about it. You step back and look at it. This is a bargain. This is an absolute bargain when you look at that map with all of the resource we have of the renewable there.

All we have to do is to transport. Give it PTC and then transport it. I start to see it as a pretty simple solution to a huge, huge problem for this country.

Senator SMITH. But you do believe private capital is available to accomplish that?

Mr. PICKENS. I think private capital can do it if you have a PTC.

Senator SMITH. Ok.

Mr. PICKENS. I think you've got to have that. I almost believe that it could work with private capital and no PTC. But it's going to be years and years to get to where you want to be.

So it becomes cheap to get rid of the burden of foreign oil.

Senator SMITH. Sure. In your vision for the future would natural gas be used as an alternative fuel as it is now or as a feed stock for fuel cell vehicles?

Mr. PICKENS. That again is an unbelievable timing for this country. You almost start to think divine intervention because here we are depleting our oil. It's, you know, we peaked in 1970 in the United States on oil. We've been in decline since that time.

If you look at natural gas. Natural gas is actually being, you're replacing your production annually. You're adding to the reserve base.

The reason for this is because we have 21 shale basins in the United States. About, I think, about four or five of them are under development now. This geologist, I would have never believed you could ever get gas out of shale. But you can.

That technology is so advanced now that there are tremendous reserves. I think you can probably—our reserves for this country is about 250 trillion cubic feet of gas. I think that that will probably be doubled with the shale reserves.

So we have the reserves now. Do we have it forever? No, you don't have it forever. I what I foresee will happen if you could move today—this I think is worth mentioning, that I have tried to promote natural gas as a transportation fuel since 1988. It was cleaner, cheaper and it was domestic.

When I tried to make that pitch that the only thing that people heard when it came out was they didn't care whether it was cleaner. They didn't care whether it's domestic. They just wanted it to be cheaper. It was cheaper. But it wasn't enough cheaper to pick up and that happened.

But what's happened around the world in the last 3 years the increase in natural gas vehicles has gone from five million to eight million. So we're eight million vehicles around the world today. General Motors makes 19 platforms out of this country but only one in this country because the demand isn't here. Not because there is anything wrong with GM.

Ok. We only have 142,000 vehicles in the United States on natural gas. We lag the world. We have the natural gas.

So it can happen. It can happen, you know, very conveniently. We still have plenty of gas for petrochemicals and other uses for natural gas.

Senator SMITH. I want to emphasize the point that I think you were making that if we're using natural gas just to make electricity we're really wasting it. We're not using it as efficiently as you're suggesting we ought to be.

Mr. PICKENS. That's hard for me to say it's wasting it. I'm not saying it's wasting because the industry has to sell their product. Once you can make the investment, now you have a well. Now you have to use it. There is no question it's the cleanest of all for, other than renewables, in power generation.

Senator SMITH. Mr. Kolevar, Oregon has some of the most promising sites on Earth for wave energy, if properly sited to avoid conflict with fisheries. We could also generate up to 200 megawatts of wave energy without needing any new transmission. Can you tell me why the Department has been so slow to embrace wave and tidal energy?

Mr. KOLEVAR. I guess it's hard to answer that question, Senator. It's not within the portfolio that I oversee. It is a technology that is receiving increased attention at the Department.

It's a technology that is still expensive. But I think that the increased attention at the Federal level through research and development efforts at the private level, a number of states, other than Oregon are interested in this as well. Hawaii as you can imagine is very interested in this kind of technology and ocean thermal and so it is one that is certainly relative to the other forms of technology, a clean technology, that we have looked at that is relatively a recent arrival on the scene.

Notwithstanding that, given the push that we're seeing toward cleaner forms of energy, I expect that it will be receiving a lot of attention in the future. I do know that there are a number of some of our best people at the Department in the lab community that are very interested in pursuing this.

Senator SMITH. I hope they will. I certainly want to encourage it. Thank you.

The CHAIRMAN. Senator Dorgan.

Senator DORGAN. Mr. Chairman, thank you very much. Mr. Kolevar, last year the President had recommended $115 million for your agency. My Appropriations Subcommittee funds the Department of Energy and related areas. I added $53 million, almost 40 percent more than the President requested because I agree with the Chairman and many of the witnesses.

This is one of the most important areas to unlock the opportunities that exist. Can you tell me why there has been, what I think, is relatively an anemic funding request from the President in his budgets for your area?

Mr. KOLEVAR. Sir, I of course, support the President's budget. But I can tell you that we have done very good work within the bounds of the funding provided through that budget but also the additional funding. I guess the real substantive answer to that question mirrors the previous question.

In my experience, and I've been at the Department for about seven and a half years now, you see attention focused on a lot of very exciting forms of technology; and resources tend to flow there. Those are resources in the forms of dollar. As well as resources in the form of the kinds of technical expertise from students coming out of college that want to get involved.

We're seeing a change. I think we're realizing a change. Not just at the Department but across the country in the need for greater support for the enabling technologies in particular that apply to the grid and electricity storage.

So, again I guess I can't offer adequate explanations to you for why we haven't in the past pushed harder on this except to say I think that's there's a great realization today. I think it's really taken place over the last couple of years, that we need to focus much greater attention on our grid——

Senator DORGAN. It requires investments in the areas where we need to get this done. The Midwest. I was just looking at Midwest ISO for example, determined if they were to do the studies for all the projects in their queue they would complete it by 2362. That's 354 years from now.

I mean, we have a lot of things to do to fix this. I just, I make the point that the President has not requested sufficient funding. I'm going to try to increase it again this year. The last person that came to this table working for this President and said that they needed a little more money, the next morning was fired.

[Laughter.]

Senator DORGAN. So if I bully—well, no, it's true.

Senator SANDERS. So watch what you say.

Senator DORGAN. It's true. In fact the person sat at that very table the day before he was fired. So I understand you have to support the President's budget.

I do think however, we have to make the right investments here. I want to make a point and then ask a question of Mr. Pickens. In 1916 we put in place a pretty substantial incentives to people to look for gas and oil. Because you go out and find yourself some gas and oil, we're going to provide some tax break.

We want you to do that. That's what our country needs and wants. So we did it. It was permanent. It's been there forever, almost. It's now almost a century.

In 1992 we said production tax credit. That's what we wanted to incentivize you to do. Production tax credit. In 1992 we put it in place, and we have extended it five times on a short-term basis. We let it expire three times. It's a pathetic, anemic response.

In my judgment this country ought to say here's where America's headed for a decade, count on it. The production tax credit, solar, other incentives, count on it for the next decade because here's where America's going. That's what we ought to do.

The bill on the floor that we can't even get passed has a 12 month extension, a miserable extension. Better than nothing, but I mean that's not where we ought to go. We ought to go in a much more aggressive way.

But the Chairman asked the question, Mr. Pickens, and I did not hear the answer, specifically. We have tried very hard to get the Federal Government to create a renewable energy standard. I happen to feel very strongly that we ought to do that.

The country ought to say here's where we aspire to go. Yet, we've been unsuccessful, whether it's 10 percent, 20 percent, 15 percent. Do you think that the market system will move in this direction of its own will or do you think it would be useful for the Congress through a renewable electricity standard to describe a goal?

Mr. PICKENS. I think you're going to have to do it. Because I don't think it's going to go that direction just because people want to do renewables. I think I'm answering the question you asked me, aren't I?

Senator DORGAN. Right.

Mr. PICKENS. Ok. Again what you'll do is you'll go back to the cheapest way to do it is the way it will be done. I mean that's the system we live in.

Senator DORGAN. But we affect the price with tax incentives, don't we?

Mr. PICKENS. Yes, we do. So if you can give some help. But I keep going back to this point and I don't think I made exactly this one, but almost.

But that you know the way we've operated here as far as energy concerned, the way our country has, it's almost like send us the oil, never mind the cost. We just kept using more and more oil. You know, and now we're up to 70 percent. We're in the trap. We are in a trap, is where we are. We're caught in the trap.

We've got to go to renewables. There's no question about it. But when you look at these studies by the DOE, clearly we have energy available to us. Why haven't we used it? We haven't used it. Now comes the leadership that causes that to happen.

Senator DORGAN. Wvery addiction ends in a trap. The question is, is there public policy that leads us out of this in a different direction. You're correct in my judgment that the market system moves to the cheapest form of energy.

Mr. PICKENS. It does.

Senator DORGAN. But we also can have a significant impact about what energy, with respect to what is the price of energy. The price of a gallon of gas is not $4. It's probably about $10 if you factor in the cost of defense and other things that we're spending in the free world.

Mr. PICKENS. Right.

Senator DORGAN. So, but we have an impact on what the price can be with respect to incentives. We put them in place a century ago for oil and gas. We can, in my judgment can send a much stronger signal for renewables than we've done.

Mr. PICKENS. I agree. I think you can send a stronger message on renewables. But we know we have it.

Finding oil and gas is a tough deal. I know. I've been in that business for over 50 years. I've found a lot of oil and gas, but it's been expensive at times, very, very expensive. You can drill a lot of dry holes.

I will say this. You won't have to have anybody before you this year that has drilled more dry holes than I have.

[Laughter.]

Senator DORGAN. Mr. President, my time has expired, but I wanted to make one additional point. Wind and solar are both intermittent forms of energy. But there are ways to firm up an intermittent form of energy.

We have a project in North Dakota that I sponsored in which we're taking energy from the wind, producing electricity through electrolysis separating hydrogen water and storing hydrogen for vehicle use. You can take an intermittent energy source and produce vehicle fuel in terms of hydrogen. So there's a lot of things we can do with wind and it's not hard to find wind, at least in North Dakota.

Mr. PICKENS. That's right. You have one of the best resources of anyplace in the country.

Senator DORGAN. The Department of Energy says it's the Saudi Arabia of wind. We are No. 1 in wind and we're number 50 in trees.

[Laughter.]

Mr. PICKENS. I——

Senator DORGAN. So there's nothing there to break the wind.

Mr. PICKENS. My ranch is in Van Allen, Texas and I've lied about wind forever, that it doesn't blow as much as you all think it does.

That's what I always say. Now I say, can you believe it, this wind is great.

[Laughter.]

Mr. PICKENS. So, you know, it's just different times in your life.

The CHAIRMAN. Senator Sanders.

Senator SANDERS. Thank you, Mr. Chairman. Mr. Pickens, there are a number of people. I think you heard Senator Reid and myself and others up here who see huge potential in sustainable energy if we can get our hands on and solve the transmission problem.

So let me start off by asking you if we got our act together. You talked about wind in the Midwest. Senator Reid talked about solar thermal in the Southwest. What percentage of electricity in this country could be generated by sustainable energy?

I think the folks from the Western Governors' Association were talking about 17 percent within the reasonable future coming from solar thermal in the Western part of this country. What do you think?

Mr. PICKENS. Ok, if you look at that map right across the top it says at 20 percent. Now that's from the DOE. We do not disagree with that.

Senator SANDERS. By when? 20 percent by when?

Mr. PICKENS. Right, that's what it says across the top there.

Senator SANDERS. Twenty percent by 2020?

Mr. PICKENS. No, they say by 2030. But I think you can beat that.

Senator SANDERS. Ok.

Mr. PICKENS. Where we differ with them is how quick it could be accomplished. If you called it an emergency, which I believe it is that. I think you could do the 20 percent in less than 10 years.

But you've got to do it quick because you have so much outflow of money.

Senator SANDERS. Right. You, I know, have been focusing on wind. What do you see the potential of solar?

Mr. PICKENS. I'm not an authority. I'm pretty good on wind. I'm not that good on solar. I'm real good on oil and gas.

[Laughter.]

Mr. PICKENS. But let me tell you that some of, you know, some people really for me to go to renewables, a geologist who's been in oil and gas his whole life they're somewhat surprised and astounded of that. But this is where we have to go. But quick answer on solar, it's there. There's no question it's there.

Now it's not as cheap. Those things are going to happen. If you'll give the incentives and tell them this is direction you want.

Just look at what the President did for ethanol. The President came out for ethanol. I mean ethanol happened. It went and it probably was not the best idea I've ever seen. But anyway——

[Laughter.]

Senator SANDERS. All right let me ask you this. Obviously we are dealing now with two international crises. There's global warming and the high price of fuel. In terms of wind, which you do know a lot about, how cost competitive is it today with other sources of energy?

Mr. PICKENS. The wind is—it's competitive. I think that the wind, I'm going to stick my neck out here, but I believe it—when

you take coal and bring it up to clean it up and everything else, I think wind will be, is competitive with coal.

Senator SANDERS. So today. Today, not in the future what you're saying——

Mr. PICKENS. No, I'm saying today.

Senator SANDERS. Today. This is an extraordinary statement that he's saying today wind is cost competitive or maybe cheaper than coal. Is that what you think?

Mr. PICKENS. I'm saying that, yes.

Senator SANDERS. Let me ask you another thing. You know a little bit about oil, right?

Mr. PICKENS. About what?

Senator SANDERS. Oil. You've heard of oil?

Mr. PICKENS. I'm ready.

Senator SANDERS. Alright.

[Laughter.]

Senator SANDERS. Now it is interesting. Many of our friends—I was on two television shows the other day and kind of conservative commentators were saying the solution is drill, drill, drill. We're going to solve all of our problems if we just drill for all the oil that is in the United States.

Now I heard you mention several times ago you believe it peak oil. Are we capable of drilling our way out of this crisis?

Mr. PICKENS. Let me take you on a little history. But we peaked in the United States at ten million barrels a day in 1970. We're now producing five million barrels a day.

Could we have kept it at ten? There's no way that we had the resources to do that. An average oil well in the United States is five barrels a day. An average well in Saudi Arabia is 5,000 barrels a day.

The Saudis are lifting six barrels of water with every barrel of oil which tells me they're mature. That's mature. The Russians are lifting nine barrels of water with every barrel of oil. We're lifting over 100 barrels of water with every barrel of oil.

So we are mature. Now could we drill our way out of it? No. There's no way you can do that.

The—I don't agree with the USGS that there's 86 billion barrels of oil off the East and West coast of the United States. Those guys work on that a lot more than I do. So I'm not going to say it's a ridiculous number. I just don't agree with it.

When I look at ANWAR I would look at ANWAR and feel like it may be time. I almost, and I laughed about it last night at dinner. I said if I was one of the Senators that voted against ANWAR, I would almost see the American people today.

It is shifting and the American people are wanting to do something. They don't know for sure what it is, but they're voting for ANWAR. I saw a poll the other day, 57 percent.

I said I almost think if I was one of those Senators that voted against it, I'd say, you know, back there when those Republicans were trying to get me to do ANWAR at $20 a barrel. It was too cheap. But now at $120 a barrel, I may be more interested in doing it.

So maybe we're coming around to a point where the value of the oil at ANWAR, and I'm not one that believes there's 16 billion bar-

rels at ANWAR either. There was 14 billion at Prudhoe Bay which is the largest field we ever had in the United States. The ANWAR does not have the same sediments because you cross a fault going east of Prudhoe Bay. See, I know this subject.

Senator SANDERS. Alright, but let me just——

Mr. PICKENS. But I don't think the oil in ANWAR is anything like 16 billion. So don't have the idea that our problems will be solved with a big discovery.

Senator SANDERS. I surely don't. Mr. Halvey, what were your estimates about what solar thermal in the Southwest from the Western Governors' Association? What percentage of electricity do you think it has the potential to produce?

Mr. HALVEY. Let me say first of all it's going to depend on, I think, the value that you're going to place on doing the solar. One of the problems that we've got with solar is that there isn't a manufacturing capacity. In the Clean and Diversified Energy Report they talked about having 8,000 new megawatts of solar online by the 2015. That was a conservative estimate. It was based on current manufacturing capacity.

If you talked to the people in those industries what they will tell you is that they will be cost competitive with the cheapest sources of energy if there are incentives, if the manufacturing capacity increases, if they can achieve the kind of economies of scale that would be available. So I think, you know Senator Reid mentioned that there's a tremendous potential. You know, exploiting that potential is going to be dependent on a lot of different things, finding the right type of land.

I mean if you look at the map of solar it looks like there's these broad——

Senator SANDERS. But you published—you issued a publication which I think said that you expected within the not to distant future, if we got our act together we could do something like 17 percent of the electricity that this country needs just from the Southwest. Is that correct?

Mr. HALVEY. What we said in the Clean and Diversified Energy Report was 8,000 megawatts by the year 2015, 8,000 new megawatts by the year 2015. That I think is a 2-year-old figure. I think we would revise it significantly upward at this point.

Senator SANDERS. Upwards, though?

Mr. HALVEY. Yes.

Senator SANDERS. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Dorgan wanted to make a short statement and then we'll go on to the second panel. Go right ahead.

Senator DORGAN. I just wanted to observe while we have substantial wind energy capability in North Dakota and we're developing it, not quite as quickly as I would like. But it's happening. We are locked by transmission problems, which is the purpose of this hearing.

We can produce, should produce and will produce much, much, much more electricity from wind. But we've got to solve this transmission problem if we're going to move the product of that around this country on a grid. So that, I mean that's the underlying foundation of this hearing which is important for us to always remember.

There's a lot of potential here. But we won't unlock that potential moving around the country in the way we need to unless we solve the transmission problem. Nobody comes to the transmission issue to say, you know what, I'm going to commit a lot of money to build and I'm not quite sure how the income stream going to be developed to pay for it. That just doesn't happen.

That's why we need some sort of policy directions and some plans to get this transmission issue solved. I appreciate the Chairman holding the hearing on that subject.

The CHAIRMAN. Let me thank our witnesses here. I think it's been very useful testimony from this first panel. Thank you very much for being here, appreciate it.

Mr. PICKENS. Thank you.

The CHAIRMAN. Let me ask the second panel to go ahead and come forward. On the second panel we have Mr. Gary Hanson with the South Dakota Public Utility Commission. I think Senator Johnson was going to make a short introduction of him when we start the panel.

Stephen Wright with the Bonneville Power Administration.

Will Kaul who is with the Great River Energy in Maple Grove, Minnesota.

Don Furman representing American Wind Energy Association.

Senator Johnson, did you want to make a statement here before we heard from your Commissioner?

Senator JOHNSON. I just wanted to take——

The CHAIRMAN. Alright, well why don't we start with you, Mr. Hanson. Why don't you give us about a 5-minute summary of what you think we need to understand on this issue. Then we'll go right to Mr. Wright and then Mr. Kaul and then Mr. Furman. Go right ahead.

STATEMENT OF GARY HANSON, CHAIRMAN, SOUTH DAKOTA PUBLIC UTILITIES COMMISSION, PIERRE, SD

Mr. HANSON. Thank you, Senator Bingaman and thank you very much Senator Johnson. Excuse me? Thank you, Senator Bingaman and thank you Senator Johnson. I sincerely appreciate having a very good, old friend introduce me this afternoon. I appreciate that immensely.

My name is Gary Hanson. I'm Chairman of the South Dakota Public Utilities Commission. I'm testifying today on behalf of that agency.

I very much appreciate the opportunity to appear before you this morning. I ask that my testimony be made a part of the record as if fully read. I will summarize my written testimony.

The South Dakota PUC regulates the retail rates and services of investor owned electric, gas and telephone utilities. We're obligated under the laws of our State to ensure the establishment and maintenance of such utility services as may be required by the public convenience and necessity and to ensure that such services are provided under rates and subject to terms and conditions of services that are just, reasonable and non-discriminatory. It is in our Nation's best interest to resolve the challenges which have retarded the healthy growth of electric transmission facilities.

Otherwise our efforts to assemble a viable, renewable energy regime will fall far short of expectations. Additionally, unless a more expeditious process is implemented to facilitate transmission expansion serving interstate needs, we will be at risk for serious reliability problems. Chief among the solutions are resolving siting and cost allocation challenges.

A disparity of policies across the states compels load serving entities to locate wind capacity and associated transmission based upon political boundaries instead of physics, economics and other best practices. Local politics and parochialism in one State should not be allowed to prohibit the economic and environmentally friendly construction of renewable energy facilities in another State. Our Nation's energy future is far too important to allow this practice to continue.

To have the greatest economic and environmental benefits practical considerations require transmission facilities be regionalized. States need to have an active role in transmission decisions. However, an effective regional transmission system requires a regional transmission authority with regional siting authority.

The present system used for pricing transmission and compensates providers for that service is essentially based on a regulatory method that is also—that is almost 100 years old. The current regulatory system does not recognize that power flows based on physical laws. Rather it assumes that power will flow based on who contracts for the purchase of power.

A robust regional electric transmission system is an essential prerequisite to support the reliability function and the market function allowing more generators to reach loads and compete directly for sales to such loads and meet national goals for renewable generation and energy independence. A new rate design is needed that will facilitate the construction of the strong transmission background required to support the Nation's electric market and reliability missions.

Any prospective transmission rate design should cover new as well as existing transmission facilities.

Facilitate not impede construction of needed new transmission facilities.

Reflect the regional use of the grid.

That power flows according to laws of physics.

Provide simplicity and certainty through a standard tariff that defines in advance who will pay for new transmission facilities.

How such costs will be recovered rather than relying on potentially contentious, costly and time consuming, case by case, facility by facility analysis of beneficiaries to determine who will pay the cost of a specific facility.

Provide certainty that the parties owning transmission facilities can obtain cost recovery and are not faced with a risk of trapped cost.

I recommend a highway/byway rate design for the Midwest ISO. Under this proposal a license plate component of the transmission rate would recover the cost of local, low voltage facilities. The cost of these byway facilities would be paid solely by the load in the local license plate zone as is currently the case.

The cost of defined high voltage highway facilities would be included in a rate charged to all loads in the footprint on a postage stamp basis. For administrative ease and to avoid case by case disputes the tariff definition of highway facilities would be determined by voltage level. Given the rate of return currently allowed by the FERC on transmission facilities and with these suggested changes, there should be no shortage of capital to invest in the needed transmission infrastructure.

I believe there are benefits for the WAPA to join MISO. However in order to be fair and equitable for all participants significant challenges need to be overcome first including reducing the cost of MISO's charges and challenges with regard to the queue. Thank you, Mr. Chairman.

[The prepared statement of Mr. Hanson follows:]

PREPARED STATEMENT OF GARY HANSON, CHAIRMAN, SOUTH DAKOTA PUBLIC UTILITIES COMMISSION, PIERRE, SD

My name is Gary Hanson. I am Chairman of the South Dakota Public Utilities Commission (SDPUC) and I am testifying today on behalf of that agency. The SDPUC regulates the retail rates and services of investor owned electric, gas, and telephone utilities. We are obligated under the laws of our State to ensure the establishment and maintenance of such utility services as may be required by the public convenience and necessity and to ensure that such services are provided under rates and subject to terms and conditions of service that are just, reasonable, and nondiscriminatory.

It is in our nation's best interest to resolve the challenges which have retarded the healthy growth of electric transmission facilities throughout our country. Without vigorous transmission capacity our efforts to assemble a viable renewable wind energy regime will fall far short of expectations. Additionally, it is extensively acknowledged that the demand for electric energy in the United States will grow by nearly 400 gigawatts over the next 23 years. That demand can not be met without significant upgrades to our present transmission system and yet investment to the infrastructure has been virtually stagnant for many years. Unless a more expeditious process is implemented to facilitate transmission expansion serving interstate needs, we will be at risk for serious reliability problems. Chief among the solutions are obtaining resolutions to siting and cost allocation challenges.

Traditionally the states have been the incubators and drivers of inventive energy policy. An example is the wide variety of renewable portfolio standards across the country. However, the product result is a patchwork of conflicting energy policies. This disparity of policies compels load serving entities to locate wind capacity and associated transmission based upon political boundaries instead of physics, economics, and other best practices. An example is the hundreds of megawatts of wind energy facilities in Minnesota that curiously end at the South Dakota border, just as the wind resource potential increases.

To have the greatest economical and environmental benefits transmission facilities, similar to renewable portfolio standards, should not be localized or nationalized; practical considerations require they need to be regionalized. This is not to say that states' rights are to be ignored. Just as states have a role in the siting of interstate highways, states need to continue to have an active role in transmission decisions. Even so, a regional transmission system requires a punctual regional transmission authority with regional siting authority. We must overcome the inability or unwillingness of individual states to provide timely action on proposed interstate transmission projects. In some instances regulatory bottlenecks are holding back the development of transmission projects as well as renewable energy in an effort to prevent clean coal projects. Local politics and parochialism in one state should not be allowed to prohibit the economic and environmentally friendly construction of renewable energy facilities in another state. And our nation's energy future is far too important to allow this practice to continue.

The present system that is used for pricing transmission and which compensates providers of that service is essentially based on a regulatory method that is almost 100 years old. The existing transmission regulatory process was developed at a time when a vertically integrated utility built the generation and transmission in its service area. The current regulatory system does not recognize that power flows

based on physical laws. Rather it assumes that power will flow based on who contracts for the purchase of power. This, of course, is fiction.

A robust regional electric transmission system is an essential prerequisite to support a) the reliability function to keep the lights on and b) the market function allowing more generators to reach loads and compete directly for sales to such loads in order to increase competition amongst generation suppliers and meet national goals for renewable generation and energy independence. A new rate design is needed that will facilitate the construction of the strong transmission backbone required to support the nation's electric market and reliability missions.

Any prospective transmission rate design should cover new as well as existing transmission facilities and (1) facilitate, not impede, the construction of needed new transmission facilities; (2) reflect the regional use of grid and that power flows according to the laws of physics; (3) provide simplicity and certainty through a standard tariff convention that defines in advance who will pay for new transmission facilities and how such costs will be recovered, rather than relying on potentially contentious, costly, and time-consuming case-by-case, facility-by-facility analyses of "beneficiaries" to determine who will pay for the cost of a specific facility; and (4) provide certainty that the parties owning transmission facilities can obtain cost recovery and are not faced with the risk of "trapped costs."

Before I describe what I believe is a much better way for pricing transmission, let me first describe the more typical methods that are being used today. The first method is the 'license plate' rate. The license plate rate method requires the load to pay a rate for transmission service based on the transmission zone where the load resides. It obviously takes its name from car license plates where each car owner purchases a license plate from its home state and can then drive any place in the nation. The problem with this method when it comes to transmission service is that a load located in zone A and wants to purchase power from a generator in zone B would only pay for the transmission in zone A. If there is transmission needed in zone B, in order to export the power from zone B to zone A, the load in zone B will have to pay for the needed transmission. There is a disincentive for the load in zone B to build transmission for the benefit of the load in zone A. Additionally, rural areas find it especially challenging to build transmission for exporting renewable energy to other states.

A second method is the 'postage stamp' rate. Under this scheme all load in a single marketing area such as the Midwest Independent System Operator footprint, would pay the same transmission rate. This is similar to paying the same postage for mailing a letter anywhere in the nation. There tends to be a lot of resistance to implementing this type of transmission pricing scheme because the more densely populated areas tend to have a lower cost for transmission service versus the rural areas. Thus if one were to implement this scheme there would be a cost shift with the urban areas seeing a cost increase for their transmission service while the rural areas would see a cost decrease.

A third method is the 'pancake rate'. With this method, each time a transaction is deemed to cross another transmission zone the user of the service pays another full transmission tariff. This is similar to paying a toll on a road. Each time a car uses the next segment of the road, the user must pay another toll. However there is a great difference on the actual use of a toll road and a power transaction. In the case of a toll road, the driver physically uses the toll road so it is appropriate that he pay for that use. However, in the case of an electrical transaction, the power the user purchases might not even flow over the transmission in the zone for which he is paying. This is actually the worst and most expensive transmission pricing method. It Balkanizes the system more than the license plate method, does not recognize how electric energy flows and hinders the development of renewable energy and energy independence. Additionally, it can stifle any generation market as costs of transport may be prohibitive. This is actually the system that we currently face in my home state of South Dakota.

The fourth and final method that I wish to discuss is the 'highway/byway' rate method. This method is a hybrid between the license and postage stamp rates discussed earlier. Under this method higher voltage transmission uses the postage stamp pricing scheme and lower voltage uses the license plate pricing scheme. The highway/byway method avoids some of the cost shift that a pure postage stamp method causes and at the same time encourages investment in high voltage transmission and generation. This nation desperately needs high voltage transmission to encourage development of renewable generation and assist with energy independence and promote reliability.

Under the highway/byway proposal, a local license plate rate would remain in place for defined low voltage facilities ("byway facilities"). The cost of these facilities would be paid solely by the load in the local license plate rate zone, as is currently

the case. This avoids much of the urban/rural cost shift mentioned previously. The cost of defined high voltage ("highway") facilities would be included in a wholesale regional formula rate and recovered from all loads in a regional market area such as the Midwest ISO footprint on a postage stamp basis. For administrative ease, the definition of highway facilities would be determined in advance by voltage level. I would suggest highway facilities should include all non-radial facilities 100 kV or greater.

The proposed highway/byway transmission pricing approach addresses the key issues. It facilitates construction by providing financial certainty. Any transmission owner would collect the cost of it's highway facilities under a regional tariff such as the Midwest ISO wholesale tariff charge and thus (under established law) eliminate any "trapped cost" risk that may exist under a tariff that does not definitively or formulaically derive an allocation of costs among transmission owners.

This proposal also facilitates construction of needed new facilities in the event an existing local transmission owner for any reason declines to undertake construction of new transmission facilities. In these situations, another transmission owner or a third party financial investor could construct new highway facilities, place the cost of the facilities into the wholesale postage stamp rate and be assured cost recovery on a basis comparable to any other investor. As a practical matter, this possibility will provide incentive to the local transmission owner to undertake the construction rather than forego the lost return to another party.

A postage stamp wholesale rate for new highway facilities would minimize disputes concerning who will pay for new facilities. While there likely would be the usual regulatory protests when the tariff change to implement the highway/byway rate design was filed at FERC, this would be a one-time contest. Once the tariff was in place, the "who pays" question is resolved definitely in the regional transmission tariff. This is an important consideration in my recommendation because it avoids the often case-by-case modeling approach to cost allocation for major new facilities and avoids the contentious and protracted debate over the modeling and other assumptions used to derive a proposed cost allocation.

In this regard, please note that the postage stamp ratemaking convention historically has been used by federal and state regulators to recover the cost of transmission and distribution facilities. Regulators long ago recognized that administrative convenience dictated a simple postage stamp convention rather than spending the time and effort to develop detailed allocation methods that could achieve only fictional accuracy. Applying the postage stamp rates to just the highway facilities continues this historical convention and at the same time recognizes the changes that we need to make in the current transmission pricing scheme to promote our national interests.

Transmission is not an end in itself; it is a means to allow the most efficient and desirable mix of electricity to reach markets. We need to recognize that transmission rates should be designed to further this goal, and we should develop transmission rates that optimize generation supply efficiencies instead of rates that stifle necessary generation development.

ADDITIONAL DISCUSSION

A. Background

South Dakota has significant wind resources and land available for the development of those resources. Those resources are essentially land locked in South Dakota because of a lack of transmission capacity. Unfortunately South Dakota, for the most part, is not part of a regional independent system operator, specifically the Midwest ISO. For this reason, any generation development in South Dakota, either wind or conventional must pay a pancaked transmission rate to get the power to market. As noted earlier, this transmission pricing scheme is a significant barrier to generation development in South Dakota. To me this is not in keeping with our state or our national goals. The major transmission provider in South Dakota is the Western Area Power Administration (WAPA). The SD PUC has no jurisdiction over WAPA so we cannot order WAPA to join the Midwest ISO even though we believe that this would be in the best interest of our state.

To me the Midwest ISO offers many benefits. The Midwest ISO has commenced regional transmission service operation, implemented joint regional transmission planning, commenced operation of day-ahead and real-time bid-based energy markets, and institutionalized centralized security constrained unit dispatch and regional congestion management. The Midwest ISO now is in the process of a functional consolidation of balancing authorities, creation of a region-wide market for ancillary services and implementation of some form of a regional capacity construct.

In short, nearly all grid and market functions have been regionalized, including pricing, except for transmission service pricing.

The pricing for transmission service first and foremost should facilitate, not impede, construction of needed new transmission facilities. A robust regional electric transmission system is an essential prerequisite to support the Midwest ISO's a) reliability function (For example, from July 31 to August 2, 2007 the Midwest ISO had excess generation trapped on the west side of the Midwest ISO due to limited transmission and while this generation was trapped on the west, simultaneously the Midwest ISO imposed emergency actions in central and eastern portions of the Midwest ISO and curtailed service to interruptible customers due to high peak demands.) and b) market function (allowing more generators to reach loads and compete directly for sales to such load as envisioned). A new rate design should facilitate the construction of the strong transmission backbone required to support the Midwest ISO's market and reliability missions.

Although I believe the slightly modified license plate pricing approach currently used in the Midwest ISO was a useful compromise initially to avoid cost shifts and facilitate the formation of the Midwest ISO, a pure license plate pricing approach no longer meets these needs of the Midwest ISO, its stakeholders or our national interests. The continued use in any pure form of license plate rate design will be counterproductive and make it more difficult than necessary to construct the transmission facilities essential to the Midwest ISO's reliability and market functions.

B. Recommendation

I recommend that WAPA join the Midwest ISO as a transmission owner. This would eliminate the pancake transmission rate that generation in South Dakota now faces. This pancaked transmission rate alone causes generation in South Dakota to be 25% higher than generation located just a few miles to the east in Minnesota. This is not good energy policy and it is certainly not good national policy.

I further recommend a highway/byway rate design for the entire Midwest ISO footprint. Under the proposal, a license plate component of the transmission rate would recover the cost of local byway facilities. The cost of these byway facilities would be paid solely by the load in the local license plate rate zone, as currently is the case.

I note that while the allocation of costs to specific customers will differ in a particular year under a postage stamp approach (compared to the existing license plate approach), over a long term planning and construction horizon, such difference should not result in large inequities. In my judgment, the essential choice is accepting a rough justice over time in the interest of the common good of facilitating the construction of needed new transmission facilities to support the Midwest ISO's reliability and the market functions versus leaving in place a license plate pricing regime likely to cause ongoing cost allocation disputes over each project and further complicate the already too difficult process of transforming a planned project into new facilities.

The cost of defined highway facilities would be included in a wholesale formula rate charged to all loads in the Midwest ISO footprint on a postage stamp basis. For administrative ease and to avoid case-by-case disputes, the tariff definition of highway facilities would be determined in advance by voltage level. I propose that the highway facilities include non-radial transmission facilities operated at a voltage of 100 kV or above. Any party that constructed such new highway facilities would place the cost of such new facilities into the wholesale postage stamp rate and obtain a formulaic revenue recovery under the Midwest ISO tariff. Under this approach, if the local transmission owner chose not to construct a planned highway facility in a timely manner, any transmission owner or third party could invest in such transmission facilities and obtain comparable formula rate cost recovery of its investment under the Midwest ISO's tariff. Given the current rate of return currently allowed by the FERC on transmission facilities and with these suggested changes, there would be no shortage of capital to invest in the needed transmission infrastructure.

The CHAIRMAN. Thank you very much.

Mr. Wright.

STATEMENT OF STEPHEN J. WRIGHT, ADMINISTRATOR, BONNEVILLE POWER ADMINISTRATION, PORTLAND, OR

Mr. WRIGHT. Good morning, Mr. Chairman. My name is Steve Wright. I'm the Administrator of the Bonneville Power Administration. There are three main points to my testimony today.

First, wind and other renewables have value to the electric utility industry and are being implemented rapidly in the Pacific Northwest.

Second, renewables in large quantities do create some cost and reliability concerns for the utility industry.

Third, we at Bonneville are taking actions to mitigate these concerns such as through the development of transmission in our region. But much work is left to be done.

Now I'm sure this committee is aware that the Bonneville Power Administration is an agency as part of the Department of Energy serving the States of Oregon, Washington, Idaho and Montana. We're a not for profit organization seeking to market power from the Federal hydro-electric facilities in the Northwest. We market about 35 percent of the energy in the Pacific Northwest and operate about 75 percent of the high voltage transmission in our region.

We have the authority to acquire cost effective generation. We have the authority to build transmission. We have access to capital through two sources—money that we can borrow from the United States Treasury, up to a limited capped amount, and the ability to use third party financing to be able to support our transmission construction activities.

We've promoted renewables over the years. We were the first to eliminate the imbalance charges for wind resources back in 2002, a policy that was ultimately adopted by the FERC. We have developed a significant number of interconnections for new wind projects in our region. We have purchased wind output that we are using to serve our customers in the Northwest.

The amount of wind on our system over the last 3 years in particular has exploded, in part due to our own policies, in part due to the production tax credit, and in part due to State policies within our region.

We now have more than 1,400 megawatts operating on our system. We are simultaneously pleased, proud and anxious about that development. We're pleased and proud because we believe the green nature of these resources represent the values of the Northwest. We're anxious because these resources have operational characteristics that we're still learning about in which, as I mentioned earlier, I do have some cost and reliability consequences that we're trying to figure out how to deal with.

To put it most simply utilities have responsibility to assure that loads and resources balance instantaneously at all times. That does make us somewhat conservative. Intermittent renewables increase the challenges because it's not clear how much they can be relied upon during the peak hour and due to our relative inability to predict their hour by hour variations.

We view these as challenges that need to be addressed and are attempting to take them head on. Two years ago we formed the Northwest Wind Integration Steering Committee, a group of utilities, developers, regulators and members of the environmental community. An action plan was developed by that committee that unanimously agreed on 16 recommendations. We're now in the process of implementing those recommendations.

One of the key recommendations was the need for new transmission to broaden the geographic base of wind supply. Thereby in-

crease the diversity of wind output that should reduce some of the operational risk of wind that I referenced earlier.

Developing new transmission under FERC's open access tariff as FERC has acknowledged has been difficult. But BPA has put together a new approach working with a group of Northwest stakeholders and with the Federal Energy Regulatory Commission. That new process has allowed us to offer what's called a network open season.

This new process does not require developers to provide up front financing, addressing one of the issues that came up in the last panel. FERC approved this approach last Friday for which we are grateful. Our open season closed yesterday. I just received the results this morning. It appears to be an overwhelming success.

We had hoped that we would receive somewhere in the range of two to three thousand megawatts of commitments, developers who were prepared to pay for transmission if we built it. Based on what we received last night, we received 6,800 megawatts of commitments. More than double what were anticipating. Over 5,000 megawatts comes from wind resources.

The probability looks good that we have found a way to break the log jam that will allow more transmission to be built, further opening the wind frontier in the Pacific Northwest. I also want to note that we're participating in the Western Electric Industry Leaders Group, a group of Western electric chief executive officers. This group recognizes that the West effectively operates as one for reliability and market purposes.

We've begun to look at the potential impacts of renewable portfolio standards and CO_2 limits in the West on rates and reliability and the policies that can help to mitigate these impacts. Particularly we've looked at a coarse screening level analysis of the cost effectiveness of new interstate transmission to support renewables. Our preliminary conclusion that requires further testing is that new interstate transmission and the development of a new renewable energy credits market is worthy of further exploration.

This recognizes however, that there's a big challenge to maintain reliability, and to fill new interstate transmission lines with intermittent, reliable, renewable resources alone. This conclusion is fundamentally driven by the potential value of renewables in more remote regions of the West potentially exceeding the cost of new transmission lines.

Mr. Chairman, from this short synopsis you can see that we've been busy with respect to renewables in particular. Yet I'm barely able to scratch the surface of the activities that we're undertaking with the time that I'm allowed. I look forward to answering your questions and would ask that my full remarks be entered into the record.

[The prepared statement of Mr. Wright follows:]

PREPARED STATEMENT OF STEPHEN J. WRIGHT, ADMINISTRATOR, BONNEVILLE POWER ADMINISTRATION, PORTLAND, OR

Good morning, Mr. Chairman. My name is Stephen J. Wright and I am the Administrator of the Bonneville Power Administration (BPA). I appreciate the opportunity to relate BPA's experience to date in bringing renewable electricity to markets and how we are positioning the agency to integrate additional renewable resources into the Pacific Northwest electricity system. My testimony today will de-

scribe the success we've experienced in bringing a significant amount of new renewable energy into our transmission system this past decade to the present. I'll discuss some of our concerns that have arisen from that experience and how we and our regional partners have responded to those issues. I'll complete my remarks by describing how we will evaluate and respond to opportunities to bring more renewable electricity to our customers in a cost-effective manner.

INTRODUCTION AND BACKGROUND

BPA, founded in 1937, is a power marketing agency under the Department of Energy. We are headquartered in the Pacific Northwest where we operate about three-quarters of the high voltage transmission and market power from 31 Federal dams in the Columbia River Basin as well as the output of one nuclear plant. We supply about 34 percent of the Northwest's electricity, selling at wholesale and at cost.

Our customers include Northwest cooperatives, municipalities, public utility districts, Federal agencies, investor-owned utilities, direct-service industries, port districts, irrigation districts, and tribal utilities. Our service area covers Washington, Oregon, Idaho, western Montana, and small parts of eastern Montana, California, Nevada, Utah, and Wyoming. BPA is a self-financed agency that recovers its full costs and repayment obligations from its customer ratepayers through power and transmission rates. BPA receives no annual appropriations for its operations.

We sell transmission-related services to more than 200 utilities, power generators (including wind generators), and power marketers. Consistent with Federal Energy Regulatory Commission (FERC) rules, BPA has one open access tariff. It provides transmission services to all customer utilities, power generators and marketers under the same rates, terms, and conditions that it applies to its own Power Services business line.

BPA'S AUTHORITIES TO BUILD AND FINANCE TRANSMISSION

BPA's statutory authorities include the authority to construct transmission lines to deliver power to customers in the Pacific Northwest. The capital costs to construct transmission lines to these sites are significant—typically $1-$3 million per mile. In addition, there are environmental and social impact mitigation considerations for siting new transmission lines.

BPA's statutory authorities give us access to capital for new transmission construction needs. In addition to a limited amount of borrowing from the U.S. Treasury,[1] we have the authority to rely on capital of third parties.[2] BPA has successfully used third-party financing of facilities, through lease-purchase arrangements, to avoid depletion of our more limited Treasury borrowing authority, which is capped at outstanding indebtedness of $4.45 billion.[3] The President's Fiscal Year 2003 Budget supported the use of third-party financing for future investments in transmission system upgrades.[4] BPA also has authorities to acquire real and personal property and to acquire real property through eminent domain.[5]

BPA'S ACTIONS TO PROMOTE RENEWABLE ENERGY

BPA's authorities to acquire resources to meet the loads of Northwest utility customers require priority for cost-effective energy conservation measures and renewable resources.[6] Wind development has become a success story for developing new renewable generation.

Commercial-scale wind development on the BPA system began in 1998 with a 25 megawatt (MW) project in eastern Oregon. Over the next several years, development proceeded slowly, but steadily. By 2005, there were 428 MW of installed wind capacity on the BPA system. During the first phase of development, BPA purchased wind output to serve a portion of our customers' load and helped nurture the growth of regional wind development in several ways. In 2002, BPA recognized that the then-current FERC standard penalty for generators who failed to meet their hourly

[1] Federal Columbia River Transmission System Act, 16 U.S.C. § 838k.

[2] See Federal Columbia River Transmission System Act, 16 U.S.C. § 838i(b)(5); see also Bonneville Project Act, 16 U.S.C. 832a(f).

[3] Federal Columbia River Transmission System Act, 16 U.S.C. § 838k(a); Continuing Appropriations for 1983, Act of December 21, 1982, Pub. L. 97-377, Title V, § 115, 96 Stat. 1830, 1912 (1982); Energy and Water Development Appropriation Act of 1984, Pub. L. 98-50, Title III, 97 Stat. 257 (1984); Consolidated Appropriations Resolution of 2003, Pub. L. 108-7, Title VII, § 701, 117 Stat. 423 (2003).

[4] Budget of the U.S. Government Fiscal Year 2003, Office of Management and Budget, at 133 (2002).

[5] Bonneville Project Act, 16 U.S.C. § 832a(e), (d).

[6] Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. § 839d

scheduled output was actually a significant barrier to cost-effective wind generation. This penalty was originally developed to provide an economic disincentive for dispatchable generation to choose to go offline. BPA determined that the variable nature of wind power generation resulted in an unwarranted penalty not likely to have the desired effect of causing operators to schedule generation more carefully and so decided to eliminate the penalty for wind generators. This change was subsequently adopted by FERC as a component of its Order 890 pro forma tariff.

In 2004, BPA developed a wind integration service that facilitated the purchase of wind energy by our public power customers by using the Federal hydroelectric system to offset the variations in wind power output. At the time, with a total of 428 MW of wind in a 9,000-MW control area, we did not experience large operational or cost issues associated with integrating the variable output of wind into our system.

By 2005, things began to change. That year, the Northwest Power and Conservation Council (Council) released its 5thNorthwest Power Plan. The 5th Power Plan called for up to 6,000 MW of wind development in the Pacific Northwest over the next 20 years. Around the same time, many utilities started aggressively marketing voluntary renewable energy options to customers interested in reducing greenhouse gas emissions, and several Northwest states enacted policies to encourage further the development and use of renewable energy by electric utilities in the region. Spurred by continued volatility in the power and natural gas markets, wind development began to increase rapidly.

Since 2005, wind development has increased rapidly in the BPA control area. Today, there are 1,425 MW of installed wind capacity directly connected to our grid. Less than three weeks ago, we recorded a new record single-hour wind output of 1,304 MW. That's a third again as much energy as it takes to power the City of Seattle. Wind development has proceeded so rapidly, in fact, that we have had to develop a new rate to recover the costs of providing the balancing services that are necessary to maintain reliability as generators' output increases or decreases.

Wind is a valuable resource, but it has characteristics that create an integration challenge from a cost and reliability perspective. Due to its intermittent nature, only part of the wind generation can be relied upon to meet peak electricity demand. Utilities must maintain adequate generation at the ready to meet peak loads if wind generation is unavailable. In addition, the output of wind generation can swing up and down in very short periods of time. See Figure 1.* That means that the generation to balance the wind fleets must be maintained to safeguard system reliability.

Much of the wind development on the BPA system has been concentrated in one general region of our system—east of the Columbia Gorge. This raised the concern that the natural variability and uncertainty of wind generation, combined with its overall low capacity value (—in other words, its tendency not to generate at times of peak load)—would be exacerbated by highly concentrated geographical development. With many of the wind projects clustered in one part of our region, they would all tend to behave in the same general fashion, creating potentially large swings in our system operation. This potential presented itself at a time of declining flexibility of the Federal hydro system because of growing non-power constraints, such as the support of endangered salmon runs.

These issues of wind's geographic concentration, system capacity needs, and system reliability created challenges for BPA about the potential impacts of integrating large amounts of wind energy into the Northwest power system. Other regional utilities shared our concern.

As a result, in August 2006, BPA and the Council co-sponsored a regional initiative to develop a Northwest Wind Integration Action Plan. Central to the effort was an attempt to examine the technical feasibility of integrating substantial amounts of wind into the Pacific Northwest electricity system. We assembled a Steering Committee drawn from the leadership of 22 regional utility, regulatory, wind development, and environmental organizations to guide the work of technical specialists from across the region who were assigned to address several key questions related to system operations, transmission expansion, and regional collaboration.

The Northwest Wind Integration Action Plan was released in March 2007 with the unanimous endorsement of the regional Steering Committee. The Action Plan concluded that the fundamental value of wind (and other intermittent resources) was to produce energy on an as-available basis to displace the output of dedicated, dispatchable firm resources such as natural gas and coal plants that would be necessary to maintain reliable electrical service. The Action Plan found no fundamental technical barriers to integrating 6,000 MW of wind in the Northwest, but did conclude that the costs of integration, per unit of wind, would increase as more wind

* Figures 1–2 have been retained in committee files.

comes onto the system. As a result, the Action Plan called for 16 specific actions to help the region meet its wind energy objectives in the most cost-effective fashion possible. First of all, the Action Plan called for greater collaboration among regional utilities to expand the availability of integration services and to spread the variability of wind energy across a broader generation base. Secondly, the Plan recommended increasing the geographic diversity of the region's wind resources through transmission construction and new transmission products such as conditional firm service. The Plan also encouraged the development of new flexibility and storage technologies to help manage wind variability and shape the energy into periods of peak demand. BPA and other regional organizations are now actively implementing these recommendations.

In a sign of real progress, BPA is joining several of the region's other utilities to participate in a cooperative effort to pool the diversity in their system operations known as the Area Control Error (ACE) Diversity Interchange Pilot Project. Experience gained from this collaborative effort may lead to other strategies for sharing flexibility resources among regional utilities and for helping dampen the rate of growth in wind integration costs.

We believe that we have established a sound regional consensus for the next steps to resolve technical challenges for effective integration and transmission of renewable energy. We next face issues of financing and building necessary transmission and managing the queue of service requests. We expect another 1,500—2,000 MW of wind to come online in the next two years, along with additional requests for transmission capacity, and, with that, continued challenges. We are committed to addressing these challenges head on.

Our immediate new initiative is known as the Network Open Season. By 2006, the number of new wind projects seeking service on the BPA transmission system had exploded to over 15,000 MW. While clearly some of this was speculative development, it became readily apparent that the prevailing method of planning and offering new transmission service would be inadequate. Network Open Season marks a major change from traditional practices associated with managing our transmission queue and financing new lines.

Under the Network Open Season, we are making contractual offers of transmission capacity to all of the entities seeking access on the BPA transmission network via our transmission queue if they sign precedent agreements committing them to take and pay for service at a specified time and under specified terms. Those who sign the agreements will be grouped into cluster studies to determine how much new transmission capacity will be needed to meet all the requests. Under the agreements, BPA has committed to provide the new transmission service if it can be offered at our embedded cost rate and all relevant environmental siting requirements can be met. BPA would secure the necessary funding, either through Treasury borrowing or from third parties. Unlike prior business models, the generation developers will not be asked for up-front financing for the transmission. Those entities that do not accept BPA's offer of new service by signing a transmission agreement will be removed from the queue. Customers can reapply for service, as BPA has committed to conduct a Network Open Season at least once a year.

The deadline for signing the first wave of these agreements was yesterday, June 16. There has been a tremendous regional response to our Network Open Season, and we are anticipating that a significant number of customers, including many wind developers and utilities seeking to purchase wind power, will have signed agreements allowing us to move forward confidently. By aggregating demand of those ready to take service, it is likely that BPA will then finance, using either Treasury borrowing or third party financing, and construct those transmission expansion projects that will be supported by the rates of the future path users.

In order to better utilize our existing transmission assets, BPA has developed a redispatch pilot that we are using to optimize generation dispatch to relieve transmission congestion. Also, BPA will offer a conditional firm transmission service product that will allow more efficient use of existing transmission capacity. These new techniques for managing congestion on BPA's transmission system will help support a more geographically diversified wind fleet in the Northwest.

A regional stakeholder Transmission Issues Policy Steering Committee has guided the development of our Network Open Season and congestion management efforts and we have been very pleased with the level of support we have received regionally as well as nationally.

CONCERNS FROM THE ENERGY INDUSTRY PERSPECTIVE

The general theme of regional collaboration that guided the development of the Northwest Wind Integration Action Plan and the design of the Network Open Season has now emerged more broadly among utilities in the Western United States.

In April, I joined the leaders of 15 Western electric utilities in signing a letter to Western state governors, regulators and other key policy makers to call for a collaborative approach to addressing the challenges of integrating renewable electricity into utility portfolios. The group began its letter by stressing the inescapable fact that "our western electric grid is fully interconnected, and [that] changes in policy, resource additions and operations affect us all."

As the letter expressed, there is concern about the potential rate and reliability impacts of evolving public policy, particularly in the West. The group believes it is imperative to look at what can be done to achieve the various energy and environmental policy mandates implemented by our home states, while ensuring the reliability of our interconnected power grid at a reasonable cost. The letter also suggests some alternatives worthy of pursuit to help mitigate these concerns.

The group identified key issues that should be considered for meeting future energy needs in the lowest-cost, most reliable and environmentally sustainable manner. In pertinent part, the key issues identified by the group are:

- Renewable resources, especially in the West, often are located far from the urban centers that need the power and will require new transmission lines to deliver them to market. Coordination is needed among state, local and Federal agencies to expedite the current planning, permitting and approval process for building new electric transmission to provide access to renewable and conventional resources while ensuring grid reliability.
- Some renewable resources, such as wind and solar, are not available at certain times of the day—when the sun doesn't shine or the wind doesn't blow. Changes are needed in our transmission systems and the operation of conventional generating resources to accommodate the inherent voltage and frequency fluctuations of these intermittent renewable resources. Future technology advances in controlled demand response, electricity storage and better wind forecasting could help address these challenges. In the interim, the group believes that new natural gas—fired and other state-of-the-art resources must be developed as a bridge to the new technologies. They also believe this will require the development of adequate natural gas infrastructure.
- Maintaining the output and operating flexibility of existing power sources is vital to managing rates, ensuring grid reliability and adequate supply while utilities pursue increased renewable energy.
- Low carbon generation resources and optimal use of the interconnected grid are major elements in the effort to address climate change. Significant investment in the research and development of low carbon generation resources and interactive grid technologies is required to meet our policy objectives.

The industry leaders group reminded the policymakers that energy efficiency is still the most economic resource and urged them to work with us to maximize the benefits of energy efficiency, advanced metering technologies and other demand-side programs for customers and our electrical system. With this reminder, they pledged to continue to work with the Western state leaders to resolve these issues.

POTENTIAL LONG-DISTANCE TRANSMISSION

It is important to remember that renewable electricity resources differ from coal, natural gas and uranium in that they generally cannot be transported, except by transmission wire. Solar energy must be generated where the sun shines. Wind energy must be generated where the wind blows. Geothermal energy exists where geothermal deposits exit. So we first must look for renewable resources that are closest to electricity load. Unfortunately, resource maps indicate that close-in attractive opportunities are limited. Another way to look at this is that large population centers generally have not developed where the wind is blowing hard much of the time.

But renewable sites can still be economical even if they are at some distance from load centers. For wind, there is an economic advantage for generation at a site located where the wind blows stronger and more continuously. In the Pacific Northwest, there are significant differences in the quality of wind throughout the region depending on the terrain and prevailing weather conditions. Since the fuel is free, energy cost at the generator is far lower at the higher quality sites.

Adding diversity to the resource mix can also improve the economics of integrating wind into the power system. A map of existing and proposed wind generating sites in the Pacific Northwest shows the high concentration of currently

planned development sites east of the Columbia Gorge. Projects were clustered in this area initially because that is where existing transmission lines are located. Also, it was the highest quality wind that was close to load centers and the existing generation—literally in the center of the BPA system. Unfortunately, production in the Gorge is highly correlated—the projects ramp up and down together as the wind picks up and abates. This limits the capacity value relative to a more geographically diverse portfolio of wind resources.

Sites that are at some distance from the Gorge would add value if the wind regime is different. Projects in one area may be increasing output while others fall off. Overall, the power system would see much more constant production which would be better able to meet consumer demands.

In addition, increasing the diversity of the renewable resource mix reduces the up and down challenges of wind. Geothermal plants generate at a near steady rate. Solar projects produce in a predictable manner during daylight hours. And ocean energy, when it becomes economically viable, is also fairly predictable throughout its daily cycle.

To take advantage of these opportunities, it may reduce costs and enhance reliability to build transmission facilities to the more remote regions of the Northwest or interregionally to capture their higher value and diversity.

The western energy leaders group collectively funded a reconnaissance study to consider the potential economic attractiveness of new high-voltage electric transmission to transport renewable electricity from renewables-rich zones to load centers. The fundamental question the study addressed is whether the differential in cost per kilowatt-hour produced from areas where the wind blows harder or the sun shines brighter is enough to offset the cost of new transmission. The study was intended to provide a "coarse screen" analysis and was not meant to be dispositive about any particular project or whether to move forward. Yet, it provides interesting and thought-provoking insights.

It is unlikely that new transmission could be justified solely by the benefit associated with wind generation alone because of the likely low capacity factors. Other uses such as resource diversity sharing, storage and shaping may be necessary to make the full benefits of transmission investment cost-effective. There are a substantial number of transmission projects under consideration in the West that will be actively testing these assumptions underlying this initial, coarse analysis. Key issues will be the differentials in renewable resource costs across the West, the cost of new transmission, the availability of financing, and financing costs.

CONCLUSION

To conclude, Mr. Chairman, legislative and regulatory policy in the Western United States is creating an explosion of renewable resource development. Bringing these renewable resources onto our utility systems creates rate and reliability challenges. At BPA, we believe the region has worked well together to understand the multiple issues; develop analytical, technical, and financial tools to respond; and to design processes to identify and site economically justifiable transmission and generation. We are also expanding our scope to work collaboratively with utilities across the West, but much work remains to be done. I look forward to answering questions from the Committee.

The CHAIRMAN. We will include everyone's full remarks in the record.

Mr. Kaul, go right ahead.

STATEMENT OF WILL KAUL, GREAT RIVER ENERGY, MAPLE GROVE, MN

Mr. KAUL. Thank you, Mr. Chairman, Senator Domenici and Senator Johnson. It's a pleasure to be here today. My name is Will Kaul.

I'm a Vice President at Great River Energy which is a large generation and transmission cooperative with operations in North Dakota, Minnesota and Wisconsin. I'm here today on behalf of the CapX 2020 project as its Chairman and also on behalf of the trade association called WIRES as its President. I'll get back to WIRES in a minute.

CapX 2020 is a collaboration of ten utilities in Minnesota, in the Eastern Dakotas and Western Wisconsin who, which was formed in the year 2004 in recognition of the need for some major grid expansion. We are a joint ownership initiative including cooperatives, municipals and investors in utilities jointly planning, financing and owning new transmission facilities. We took a two prong approach in our initiative.

One was to develop a long range, comprehensive, coordinated plan for grid expansion out to the year 2020. The other was to address certain regulatory issues that we felt needed to be addressed in order for us to achieve that vision. We have accomplished both of those things including going to our State legislature and getting some cost recovery issues and others things addressed by our State legislature.

I'm happy to report today that our first group of projects is now moving through the regulatory process in Minnesota. We have about 700 miles of primarily 345 kV projects. $1.7 billion of investment, now moving through the process with the support of all of major stakeholders.

That includes the Minnesota Department—or Minnesota Office of Energy Security. It includes a broad coalition of environmental groups. It also includes the Midwest ISO.

In the year 2007 the Minnesota legislature passed a law requiring 25 percent of all energy produced by utilities be renewable by the year 2025. That required our planners to go back. Make some major adjustments in our plans.

They now are in the process of developing another set of projects similar in size and scope to the first group of projects. So that by the year 2016 we expect to have over $3 billion of new transmission infrastructure in service. So far, so good.

We're now looking beyond that timeframe. We realize that we need to bridge beyond the time of 2016 out to the year 2025. We also realize that we need to bridge beyond the geography of Minnesota. We see that effort is going to require an extraordinary level of cooperation among many people among the utilities, among the various State regulators in numerous states, with wind developers and with others.

The CapX effort has been very successful so far. But it's been successful because of a number of reasons. We've had very favorable situation we're dealing with.

We have a clear State energy policy. We have a group of utilities that are used to working with each other. We have an opportunity for great economic development benefits from the wind generation. We have the support of the environmental groups, etc, etc.

When you expand beyond the boundaries of Minnesota and go into the MISO market then you add many, many other political jurisdictions, different kinds of energy policies, different ways of recovering costs, some very significant challenges there. There are a number of efforts that are going on right now to address some of those issues.

First and foremost I would say the Midwest ISO, which operates an organized market in our area, has brought together the planners of the utilities of the region. We're developing a plan for meeting the renewable energy requirements of all the states within

MISO. So instead of a 6,000 mega watt market that we need just for Minnesota, we're talking about 15,000 or more megawatts in the entire MISO market.

So they are convening a group. They're also working to develop a plan. They're also working on tariff design which is critical. Cost recovery is critical for every project of this scale.

Also, going on at MISO is a study with the PJM market, the Tennessee Valley Authority and also the Southwest Power Pool to look at inter regional transmission needs for a 20 percent renewable energy requirement for the Eastern Interconnect, another very important study.

Another parallel effort that's going on is the Midwest Governors' Association. They had a summit this last fall with a very aggressive renewable energy platform. They recognized transmission is a critical strategy for achieving that goal. Working groups now are working on transcending all of the issues from State to State.

Finally CapX itself is looking at its own business model recognizing the need to expand its partnership beyond the ten utilities that are currently involved and involve American Transmission Company in Wisconsin, ITC in Southern Minnesota and Iowa, Basin Electric and WAPA out West. We are looking at how we can partner and plan with those other utilities.

So that's a quick discussion of what CapX is doing. I wanted to mention the WIRES organization. It's a coalition of transmission owners and transmission customers, independent system operators and others. That it's trying to elevate the profile of transmission in the energy policy debate.

Se've done a couple of projects I wanted to make you aware of. One is we did a major piece last year on cost recovery. It outlines principles for cost recovery. We have a blue ribbon panel that we empanelled to do this with national and international experts in economics, engineering and public policy.

Also a very germane to this hearing we also are doing a study on clean energy corridors. We're looking at the proposal of Senator Reid and also proposals in Colorado, California and Texas. We're trying to look at them to see what can be learned from those practices and what the best practices might be.

Thank you, Senator. I appreciate your attention.

[The prepared statement of Mr. Kaul follows:]

PREPARED STATEMENT OF WILL KAUL, GREAT RIVER ENERGY, MAPLE GROVE, MN

Mr. Chairman, members of the Committee, my name is William Kaul. I serve as the transmission vice president at Great River Energy, a generation and transmission cooperative located in Maple Grove, Minnesota with operations in North Dakota, Minnesota and Wisconsin. I am a founder and chairman of CapX 2020, a collaboration of 10 utilities including Xcel Energy, Minnesota Power, Otter Tail Power, Missouri River Energy Services, Southern Minnesota Municipal Power Agency, Central Minnesota Municipal Power Agency, Wisconsin Public Power Incorporated, Dairyland Power Cooperative and the Rochester Public Utilities. I am also the president of WIRES, a national coalition of transmission providers and customers. Today I will talk about the work of both CapX 2020 and WIRES aimed at the necessary expansion of electric transmission infrastructure.

CapX 2020 collaboration.—CapX 2020 was formed in 2004 in recognition of the need for a coordinated vision for grid expansion in the greater Minnesota area. CapX 2020 is a "joint ownership" initiative that involves cooperative, investor-owned and municipal utilities in the planning, financing and ownership of new trans-

mission. A package of materials further describing CapX 2020 and its proposed projects is included with this testimony.*

CapX 2020 took a two-pronged approach to planning and implementing a vision for grid expansion by: 1) establishing a coordinated and comprehensive planning process, a "vision study", for grid expansion in our collective service territories, and 2) seeking a workable regulatory environment that will enable that vision to be realized.

Vision study.—CapX 2020 set a planning horizon of 15 years, projected load growth during that period and ran scenario analyses of different generation mixes, assuming a 10% renewable energy component. The result was a conceptual plan, a vision for grid expansion, with transmission line projects prioritized in groups.

Regulatory environment.—Regulatory reforms were needed to reduce project risks, ensure cost recovery and make the permitting process more predictable and efficient. We collaborated with stakeholder groups including regulators, environmental groups and others on a legislative initiative that resulted in formula rates for the investor-owned utilities, ensuring predictable revenue recovery and cash flow, streamlined permitting of need and siting, recognition of transmission as regional infrastructure and the ability to transfer assets into a transmission-only company if deemed in the public interest by the Minnesota Public Utilities Commission.

Group 1 project status.—CapX 2020 Group 1 projects are currently pending state regulatory review and approval. Group 1 projects include four transmission lines, three at 345 kilovolts (kV) and one at 230 kV, totaling 700 miles in length and projected to cost $1.7 billion. The 345 kV projects have been grouped into a single certificate of need filing and are supported by all major stakeholders, including the Minnesota Office of Energy Security, the environmental coalition and the Midwest ISO. With this support, the environmental coalition and the Office of Energy Security are recommending these 345 kV projects either be upgraded to a higher capacity or built to support future double circuit capability. The 230 kV project has no interveners in its certificate of need filing.

Minnesota Renewable Energy Standard and Group 2.—In 2007, the Minnesota Legislature passed a law (MN RES) requiring all utilities to generate at least 25% of their electricity from renewable sources by the year 2025, with Xcel Energy required to meet a 30% requirement by 2020—25% in the portfolio needs to be sourced from wind power. Included in the law is a requirement that utilities develop a transmission plan enabling compliance with the MN RES. This dramatically changed the planning assumptions from the original CapX 2020 Vision Study. CapX 2020 is now in the process of developing another group of 345 kV projects similar in scope to Group 1 that are intended to achieve renewable energy milestones through 2016. CapX 2020 expects to invest more than $3 billion in the first two groups of projects by 2016.

Bridging beyond the 2016 timeframe and Minnesota's geography.—Our planning horizon is now in the 2016 to 2025 timeframe. We realize that the excellent wind resources located in the Upper Midwest can and should be developed for a much broader market. While it is expected that 6000 MW of wind will be developed just to meet the MN RES, the market potential for Midwest states is much greater and we are now shifting our focus beyond the greater Minnesota region.

As the demand for renewable energy in regional markets evolves, the Upper Midwest states will develop renewable energy resources that will need transmission for exporting renewable energy to distant markets. Accomplishing that feat will require an extraordinary level of cooperation among utilities, state regulators and legislators, renewable energy developers and other stakeholders. While CapX 2020 has been a very successful initiative, it was achieved under very favorable circumstances: one primary political jurisdiction, a clear state energy policy, an organized energy market and tariffs (MISO), the prospect of significant economic development from wind generation and the support of environmental groups. The challenges of developing major inter-regional transmission infrastructure increase exponentially with additional political jurisdictions, multiple transmission providers, conflicting energy policies, differential economic benefits, etc.

New initiatives to address new challenges. Several parallel efforts are underway to address these challenges:

1. Midwest ISO.—The Midwest ISO has begun an initiative, the Regional Generation Outlet Study (RGO study), that brings together planners from across the MISO footprint to develop an expansion plan for renewable resources that meets the needs of the MISO market. In addition, MISO is conducting a joint planning effort with PJM, Tennessee Valley Authority and Southwest

*Additional materials have been retained in committee files.

Power Pool to evaluate needed transmission under a 20% wind energy mandate for the Eastern Interconnection.

2. Organization of MISO States.—This is a group of public utility commissioners, one from each state within MISO, that is closely monitoring the activities of MISO and utilities within MISO. The attention of this group to grid expansion planning is critical since it is the public utility commissions who certify the need for new transmission projects, site the lines and rule on cost recover at retail.

3. The Midwest Governor's Association.—The Midwest Governor's Association held an environmental summit last fall. Its stated objectives were to improve energy efficiencies, deploy lower-carbon renewable and fossil fuels and implement geologic CO2 storage and terrestrial carbon sequestrations. The MGA identified the development of transmission for renewable energy as a key strategy for goal achievement. The MGA has working groups now addressing the carbon reduction and transmission expansion issues.

4. CapX 2020 future strategy.—The CapX 2020 utilities are developing a strategy on how to plan and partner with other transmission developers in the region such as International Transmission Company (ITC), American Transmission Company (ATCo), Western Area Power Administration (WAPA), Basin Electric Power Cooperative and others, with an objective to develop needed transmission projects to maintain reliability and satisfy the various renewable requirements within the Midwest. Just last week, CapX 2020 convened a forum for transmission system planners from these companies to initiate broader regional transmission plans. CapX 2020 also is actively participating in the MISO RGO study and the MGA working groups.

WIRES.—Working at a national level, CapX 2020 is a founding member of WIRES, which was formed in 2006 and is the nation's only pure transmission advocacy group. WIRES membership includes CapX 2020, ITC, Trans-Elect, National Grid, ONCOR, Xcel Energy, FPL Energy, Quanta Services and Northeast Utilities.

WIRES believes that policy issues must be addressed in order to achieve necessary transmission expansion. In 2006, WIRES convened a Blue Ribbon Panel on cost allocation consisting of nationally and internationally recognized economists, engineers and public policy experts. I am providing the Committee with copies of their report submitted with my testimony. One of the critical barriers to transmission expansion is cost allocation—and resolution is paramount in order for large scale transmission grid expansion.

WIRES has just commissioned an additional study to evaluate various proposals for integration of wind and remote clean energy resources into the existing transmission grid. In addition to proposals introduced as legislation in Congress, a number of states, including Texas, California and Colorado have developed and implemented renewable energy zone concepts and related transmission expansion and upgrade policies. WIRES will examine these initiatives with an eye out for what can be learned from the experience so far and to identify "best practices". The study is scheduled to be completed this fall and WIRES would be pleased to be able to share the results with the Committee.

On behalf of the CapX 2020 consortium, WIRES and Great River Energy, thank you for inviting us to participate in this hearing. I look forward to answering any questions you may have.

The CHAIRMAN. Thank you very much.

Mr. Furman, you're our wrap up witness today. So go right ahead.

STATEMENT OF DONALD N. FURMAN, REPRESENTING AMERICAN WIND ENERGY ASSOCIATION

Mr. FURMAN. Mr. Chairman and members of the committee, thank you for the opportunity to appear today. My name is Don Furman. I'm Senior Vice President for Iberdrola Renewables. We are America's second largest developer and operator of wind generation. So we're the ones who are making the investments and trying to find our way through the transmission system to get to the market.

I'm appearing today on behalf of the American Wind Energy Association for whom I'm the President Elect and the Chair of the

Transmission Committee. Since I am batting clean up I'm going to try to say a few things that hopefully you can remember and not repeat.

First of all, talking about the DOE report. The thing that comes out of the DOE report that's important to remember is that wind energy and achieving the 20 percent goal is absolutely feasible. We're here talking about the one thing that the 20 percent—that the DOE report identified.

The CHAIRMAN. You're saying the 20 percent by which year?

Mr. FURMAN. 2030. I'm sorry, did I misspeak?

The CHAIRMAN. No, no. You didn't misstate it. I just wasn't clear.

Mr. FURMAN. Now the DOE report I think was trying to, I think the point of the DOE report was to identify what was truly the art of the possible. The one issue that DOE raises that is a significant issue and which we're here to talk about today is the transmission system.

There have been a number of numbers thrown around today. I believe Mr. Pickens was asked what the cost was for the system. He was right on the total cost.

I want to add one other point though. That is I'm going to quote Suedeen Kelly, Commissioner at the FERC who recently noted that if we were to make the investment identified in the DOE report it's about 50 cents per customer on the average bill. It's not a big investment. It's not going to have a big impact.

In fact transmission, typically those of us in the power industry who look at transmission, it's a relatively small part of the average bill. But it has big impacts. The investment itself and the recovery of that investment is a small part of the bill.

But it has big impacts on the overall bill because it enhances reliability. It allows access to the least expensive resources. It allows those inexpensive resources to be operated the most. So it's a very, very good investment overall.

In fact the investment in the transmission system in this country, it was pointed out earlier. Senator Bingaman, I think in your opening remarks, you noted that we have lagged behind investment in this part of our infrastructure. It affects reliability. It affects our ability to operate the system at lowest cost.

We need to do this anyway. Forget about renewables. We need to invest in this transmission system anyway.

Renewables is a great additional reason to do it. It is, as has been pointed out, it is an impediment. So why aren't the investments happening.

The single biggest issue in making investments in this country is the fact—it's not a lack of capital. It's not a lack of investment incentives. We've tried that and it hasn't really made that much of a difference.

It's the division of responsibilities between Federal and State government. It's been eluded to several times. The reality is most of the transmission investment in this is owned and operated by investor owned utilities that are regulated at the State level.

So that investment sits in State rate base and it is under the control and the regulation of people like my colleague to the right, Commissioner Hanson. Commissioner Hanson in his comments, I thought, made some very courageous statements which is this

needs to be regionalized. We can't be making these decisions on a State by State basis.

How we do that? There are a number of different ways we can do it. But somehow we've got to have a decisionmaking process that allows the differing State interests to be compromised in the national interest. That's very, very critical.

I think it's time to start that dialog. You cannot expect a State Commissioner, who is in some cases elected or at a minimum, is at least appointed to be out comprising it, his or her State's interest, when their job is to look after the individual consumers of that State. You know, we have a lot of Commissioners in this country who understand that, at the State level who understand that. Yet it's too much to ask I think for them to do that.

The third point I want to make is the importance of the Federal power marketing agencies. This transmission investment that is controlled by the Bonneville Power Administration, the Western Power Administration, TBA and others is regionalized. Those costs are recovered over a regional basis. The decisions are made on a regional basis because those agencies cover those broader areas.

They also have condemnation authority. They have the ability to essentially socialize or peanut butter those costs. Those, particularly Western Area Power Administration, the Bonneville Power Administration are in the windy State areas. So they're very, very critical. I do applaud Administrator Wright. I sat Friday for about an hour signing transmission contracts in his open season. I'm glad to hear that it was as successful as it appears to have been.

So we are poised to change the electric system in ways that benefit national security, consumers, the environment. It's very important that we get creative. We step away from the old way of doing business and find ways to make this investment flow. The dollars are there. There's plenty of dollars available to invest in the system.

That concludes my remarks. I'd be glad to answer any questions. Thank you again for the opportunity.

[The prepared statement of Mr. Furman follows:]

PREPARED STATEMENT OF DONALD N. FURMAN, REPRESENTING AMERICAN WIND ENERGY ASSOCIATION

INTRODUCTION

Mr. Chairman 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 Donald N. Furman. I am Senior Vice President of Business Development, Transmission and Policy for Iberdrola Renewables, an energy company that, among other things, is engaged in the development and operation of wind and solar electric generating facilities. Iberdrola Renewables is the leading generator of wind energy worldwide and is the second largest wind energy generator in the United States. Assuming that Congress acts to further extend renewable energy tax credits, Iberdrola Renewables plans to invest at least $8 billion between now and 2010 in wind and solar energy projects located in the United States. I am also appearing here today on behalf of the American Wind Energy Association where I serve on the Board of Directors and as Chairman of the Transmission Committee.[1] In a prior job, I ran the transmission business for a large, multistate utility in the West. As a result,

[1] Iberdrola Renewables is also represented on the Board of Directors of the Solar Energy Industries Association, which shares many of the same transmission-related concerns as the American Wind Energy Association.

I have had the opportunity to view transmission issues from the perspective of both a transmission developer/operator and a transmission customer.

The purpose of my testimony is to discuss the essential link between a robust, properly functioning electric grid and the ability of emerging renewable energy technologies, such as wind, solar, and geothermal, to meet a substantial portion of the nation's demand for electricity.

According to a report released last month by the Department of Energy,[2] wind power on its own could supply twenty percent of all the electricity consumed in the United States by 2030.[3] The benefits would be enormous:

- Electric sector greenhouse gas emissions would be reduced by 25 percent;
- The amount of natural gas required to generate electricity would be cut by 50 percent and United States gas consumption would be 11 percent lower overall—helping to limit our reliance on energy imports and reducing consumer energy costs;
- Because water is not required to operate wind farms, water consumption would be reduced by 4 trillion gallons;
- Approximately 500,000 new jobs would be created; and
- Local tax revenues would rise by more than $1.5 billion.[4]

The Department of Energy report analyzed the barriers that must be addressed to reach the twenty percent target and concluded that two distinct, but related, transmission barriers are critical. The first is transmission infrastructure. Many of the best sites for the development of renewable energy facilities are located in remote areas, some distance from population centers where most electricity is consumed or in places that the existing transmission grid does not reach. Without sufficient levels of transmission capacity many good wind and other renewable energy sites will not be developed. I would note that there are a number of potential wind, solar and other renewable energy projects in most of the states represented by members of this Committee, including New Mexico, North Dakota, South Dakota, Oregon, Washington, Colorado, Montana, Idaho and Wyoming, which are not being developed today because of transmission constraints.

The second key barrier is power system operation with high levels of variable resources, such as wind, given our current system of balkanized electricity grids. The Department of Energy report concluded that twenty percent wind is feasible if each of the three electric grids—the Eastern Interconnect, the Western Interconnect and Texas—operate more like single large power pools instead of the current system of 140 independent balancing areas. This would also improve the efficiency and reliability of the system.

Before discussing the policy options for addressing these transmission barriers, I would like to emphasize that the lack of a long-term stable policy structure has hampered the environment for investments in new renewable energy facilities and the transmission to connect them to the grid. With the renewable energy production tax credit ("PTC")[5] currently scheduled to expire on December 31, 2008 and the current uncertain legislative environment, projects representing thousands of megawatts of renewable energy expected to be installed next year are now in question. The PTC, since its enactment, has expired on three separate occasions and has never been extended for longer than a three year period. The stop-start nature of the PTC has impeded development of a domestic manufacturing base and has raised significantly the capital cost of a wind power project.[6] It is important for Congress to extend the PTC as soon as possible for as long as possible. Congress should also consider more stable long-term policies, including the adoption of a national renewable portfolio standard ("RPS"). We applaud Chairman Bingaman's leadership on this issue and hope that Congress will adopt RPS legislation soon.

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[2] "20 Percent Wind Energy by 2030—Increasing Wind Energy's Contribution to U.S. Electric Supply" ("20 Percent Wind Energy Report"), U.S. Department of Energy (May, 2008).

[3] In addition, there are over 6,800 gigawatts of solar energy resources that could, potentially, be tapped in seven southwestern states alone. "Analysis of Concentrating Solar Power Plant Siting Opportunities: Discussion Paper for WGA Central Station Solar Working Group", M. Mahos, National Renewable Energy Laboratory, July, 2005 at page 2.

[4] Id. at pages 12-18.

[5] 26 U.S.C. §45. The PTC is currently available for the production of electricity from wind, geothermal, biomass, small irrigation, landfill gas, trash combustion facilities and certain type of hydropower facilities. Solar power facilities are eligible for an investment tax credit, in lieu of the PTC, which is also scheduled to expire on December 31, 2008. 26 U.S.C. §48.

[6] "Using the Federal Production Tax Credit to Build a Durable Market for Wind Power in the United States", Ryan Wiser, Mark Bolinger, and Galen Barbose, Lawrence Berkeley National Laboratory (November, 2007) at page 9.

BACKGROUND

As a nation, we are facing a potentially serious transmission crisis. Between the mid-1970's and the late-1990's investments in new electric transmission capacity dropped from an average of $5.5 billion per year to less than $3 billion per year (adjusted for inflation).[7] Although transmission investments have risen in recent years, the United States faces the prospect of not having sufficient transmission infrastructure to meet the growing demand for electricity in a carbon-constrained environment. According to Richard Sergel, the President and CEO of the North American Electric Reliability Corporation (NERC): "[T]he grid will be threatened unless we build the transmission infrastructure that is necessary to support renewable resources like wind, that will enable us to locate new clean coal facilities—or even gas facilities . . . It doesn't matter if it's going to be the clean coal plant or the nuclear plant or the wind project or the solar project. The common denominator is that they are going to require transmission to move it from where it is toward the load centers."[8]

The lack of sufficient transmission capacity not only challenges the ability of utilities to keep the lights on, it also increases the price of electricity. Transmission congestion limits the ability of utilities to access cheaper sources of generation that may be located some distance away. Congestion also limits fuel diversity. If there is not sufficient transmission capacity to access electricity generated at remote locations, utilities will be forced to rely increasingly on natural gas-fired electric generation facilities which are easier to site closer to load centers. There are legitimate concerns that a dramatic rise in the reliance on natural gas for electric generation will further increase U.S. demand for energy imports and will increase the pressure on gas prices.[9]

Although the level of investment that will be required for new transmission facilities is substantial, the costs of doing nothing are far greater, both in terms of reliability and overall electricity prices. Transmission typically makes up less than ten percent of the delivered cost of electricity.[10] New transmission capacity typically enables a utility to access lower cost generation—which makes up a much larger portion of consumer electric costs[11]—and thereby the transmission more than pays for itself. The Midwest Independent System Operator ("MISO") recently examined the costs and benefits of developing 16,000 megawatts of wind energy on the MISO system and 5,000 miles of new 765 kv transmission lines to enable the transmission of wind energy generated in North and South Dakota to the New York City area. Even though the generation and transmission costs would amount to approximately $13 billion, the study determined that, on a net basis, consumers would save approximately $600 million per year because the new transmission would enable utilities to acquire lower cost electricity.[12]

In the 1950's this country united to create the national interstate highway system in order to address an increasingly antiquated transportation system. I believe that a similar effort for interstate transmission highways would bring substantial benefits, prevent blackouts, and enable the nation to reduce its greenhouse gas emissions and promote energy security through the use of domestic renewable resources.

TRANSMISSION AND RENEWABLE ENERGY

As the attached map* demonstrates, the United States is blessed with substantial wind resources. However, it also identifies the challenge—significant transmission investments will be required to access these remote resources. According to the Department of Energy, an investment of $60 billion in new transmission capacity is needed between now and 2030 to enable wind power to supply twenty percent of our electricity.[13] This would amount to approximately $3 billion per year, a modest addition to the $8 billion that has been spent in recent years on transmission infrastructure.[14] This is a small price to pay given the plethora of benefits that would result from reaching the twenty percent target. Congress, federal and state regulators and industry all need to work toward this goal.

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[7] "20 Percent Wind Energy Report" at page 94.
[8] Statement of Richard Sergel, President and CEO of the North American Electric Reliability Corporation, American Wind Energy Association Press Conference (March 19, 2008).
[9] "20 Percent Wind Energy Report at pages 12-17.
[10] Energy Information Administration Annual Energy Outlook (2005).
[11] Ibid.
[12] "20 Percent Wind Energy Report" at page 96.
* Map has been retained in committee files.
[13] Id. at page 98.
[14] Id. at 94.

The U.S. electric grid was not originally designed to be operated on a large integrated basis. Instead, the grid was initially built primarily to enable individual utilities to meet customer needs with locally generated electricity. There was not much need to accommodate transactions spanning several state borders or across regions. Regulatory oversight was set up accordingly, at the state level, with limited authority provided to the Federal Energy Regulatory Commission ("FERC").

The two main barriers to transmission development are cost allocation and siting of transmission lines. Cost allocation is a challenge because of the incentive to free ride. Many states, utilities, and end users across a wide region and over a long time period benefit from interstate transmission, and it is not in any of their interests to pay for something that benefits so many others. With jurisdiction largely at the state level, where state public utility commissions ("PUCs") generally permit cost recovery of only those costs that provide direct benefits to that state's ratepayers, it is difficult to gain approval for the recovery of costs associated with interstate transmission. The situation with siting is similar. State siting approvals are based on demonstrations of need where "need" is defined as impacts within the state. Interstate lines that benefit a region and the nation can be prevented from being built by individual states. States may also fail to consider regional needs when approving the location of specific transmission lines.

Moreover, utilities have little regulatory incentive to build transmission facilities of the appropriate size. A 765 kv backbone transmission facility can transmit much more electricity more efficiently than a 345 kv line which might be of sufficient size for a utility to serve its traditional customers. State regulators are unlikely to permit utilities to recover the costs of these larger lines which provide broader benefits.

FERC has limited jurisdiction and has been given little encouragement by Congress to address regional and national objectives. The Commission has no authority over utility decisions to build transmission or, generally, over a utility's ability to recover transmission investments. Even in areas where most transmission has been placed into FERC-jurisdictional Regional Transmission Organizations ("RTOs"), utility members of RTOs can change their membership status to avoid assignment of costs. Moreover, FERC has been too deferential to state wishes on cost allocation.

The Energy Policy Act of 2005 did provide FERC with limited siting authority.[15] However, given the tremendous controversy surrounding the Commission's siting authority and the limited areas where FERC is authorized to approve a transmission line, there is considerable uncertainty whether this authority will yield significant new transmission investments.

There are some innovative state-based solutions that should be commended. Several states, including Texas, Minnesota, California and Colorado are pro-actively planning to access renewable energy. In addition, the Western Governors Association has initiated a four-phase regional transmission development and cost-allocation strategy with the intention of unlocking the region's vast supplies of wind, solar, geothermal, biomass and wave power. The Midwest Governors Association has also initiated a wide ranging process to promote regional transmission for renewable energy. While these state-based efforts will help, there are limitations to what they can accomplish. There is a significant national interest in the proper development of the transmission grid to access renewable energy resources that only Congress can adequately address.

INTEGRATING VARIABLE RESOURCES

In addition to ensuring that there is sufficient transmission capacity to access our country's enormous renewable energy resources, it is equally important that the electric grid functions effectively. Wind, solar and certain other resources generate power on a variable basis. For instance, wind power fluctuates depending on the wind speed where the wind project is located. Electric systems need to accommodate this variability just as they accommodate constantly changing levels of consumer demand. This is easier to do in regions served by RTOs because generation and demand is balanced over a broad geographic region.[16] Wind generation tends to be less variable the broader the region—the wind may die-down in one area and pick up in another at the same time. The breadth of RTO regions also provides greater access to conventional sources of electric generation that can ramp up and ramp down to address the variability of wind and certain other renewable resources.

[15] Section 1221 of the Energy Policy Act of 2005 authorizes FERC to consider the approval of a transmission line proposed to be located in a National Interest Electric Transmission Corridor as designated by the Department of Energy if state regulators fail to approve the line.

[16] "Facilitating Wind Development: The Importance of Electric Industry Structure", B. Kirby and M. Milligan, National Renewable Energy Laboratory (May, 2008).

I recognize that some regions have put RTO development on hold and it is unlikely that new RTOs will be established in those regions any time soon. In the absence of RTOs, utilities need to work together to achieve some of the same benefits of reliability, efficiency, and integration of non-dispatchable resources. These actions should include the consolidation of balancing areas and the sharing of generation across balancing areas to address variability issues.

TRANSMISSION POLICIES REQUIRED TO PROMOTE RENEWABLE ENERGY DEVELOPMENT

It is essential that Congress and the Federal government act to help promote a more robust and effectively functioning electric grid, if we are going to reap the full benefits associated with the nation's renewable energy resources. As I have discussed, the current regulatory structure is not well-suited to the challenges of the future. Unless Congress makes it easier for utilities and other entities to build the transmission necessary to access our renewable resources, consumers, the economy and the environment will suffer. It is imperative that Congress remove these barriers to help meet our national goals of reducing greenhouse gas emissions, enhancing our national energy security, providing consumers with reasonably-priced electricity and growing the economy. More specifically, Congress should ensure that:

- There are sufficient incentives to encourage investments in the transmission facilities necessary to fully develop our renewable resources;
- The costs of new transmission facilities are fairly allocated to take into account regional and national benefits, including the development of renewable electric generation;
- Utilities are able to recover the costs of reasonable transmission investments;
- States cannot unfairly inhibit the development of transmission that will provide multi-state benefits;
- U.S. power marketing agencies, the Department of Energy, and FERC are encouraged to promote regional transmission infrastructure and system operations in support of renewable energy development; and
- Legislation regulating greenhouse gas emissions recognizes the contributions transmission can make to reducing emissions in the electric generation sector.

I want to commend Senator Reid for his leadership in introducing S. 2076, the Clean Renewable Energy and Economic Development Act.[17] This legislation would establish national renewable energy zones, encourage regional cost allocation for transmission built to serve renewable generation, enable utilities building transmission in renewable energy zones to recover their costs from ratepayers, and fund Federal utility construction of transmission in renewable energy zones if private entities fail to make their own investments. The Reid bill also would require the Bonneville Power Administration ("BPA") and the Western Area Power Administration ("WAPA") to use their transmission systems to aid in the integration of wind and solar power. These are all remedies that would prove extremely helpful.

Senator Reid's legislation wisely recognizes that the Federal utilities can play an important role in promoting the development of renewable energy. BPA and WAPA, in particular, are two of the largest transmission owners in the Western United States. Both serve regions with substantial wind and solar resources. Both are able to build transmission without some of the barriers faced by utilities subject to state regulation. In particular, through its Open Season process, BPA is helping utilities in the Pacific Northwest access renewable energy and other remotely located electric generation by engaging in a program designed to build additional transmission capacity. We encourage Congress to provide similar authority to WAPA, to help promote the development of renewable resources in North Dakota, South Dakota, Colorado and other states served by WAPA.

Mr. Chairman, this concludes my prepared presentation. I am happy to respond to any questions you and members of the Committee may have.

The CHAIRMAN. Thank you very much. Let me first turn to Senator Domenici. He hasn't had a chance to ask any questions that he might have.

Senator DOMENICI. First, Mr. Chairman I—and members of the panel and those who were on the previous panel I know probably have gone. But I want to state publicly my—that I feel very badly

[17] Congressmen Jay Inslee and Earl Blumenauer have introduced a similar bill—H.R. 4059, "The Rural Clean Energy Superhighways Act".

that I was not here. But this place it's hard to be in two places at once.

We had a meeting called by our Republican leader. I was supposed to be there because the meeting is about something I do around here. So I go and be a participant or go and don't go and let a major issue go into somebody else's hands. So I apologize. I'm sorry.

I just want to be brought to date from one of you in a very simple way. When we have, when Senator Bingaman and I were putting the big bill together 3 years ago, the one that took us so long and everybody was pleased with the reform. We did have an opportunity to address the impact that pipelines were having.

We did provide a way to end up resolving disputes that we unresolvable and the Federal level would take over and resolve the issues. Is that not right? Didn't we do that in our bill?

Yes, the transmission corridors part of the national bill? What does it do? What are the things we have to add to it to do what you're talking about? Mr. Furman, could you talk about that a minute?

Mr. FURMAN. Sure, Senator. The provisions of that bill provide back up authority.

Senator DOMENICI. Right.

Mr. FURMAN. So in the case where there isn't investment being made, the Federal Government essentially can step in and provide that back up authority. Unfortunately, particularly in the case of renewables, that authority has not been construed to extend to essentially an extension cord into a renewable energy zone. The back up authority has been construed to be there to relieve congestion on the system.

Now you might argue that the lack of a line going from North Dakota into Chicago is congestion because there is no line there. But so far that's not the way it's been interpreted. So and I think the other issue is, frankly, that transmission lines are often controversial. I think there's been a reluctance on the part of the government to invoke that authority unless it's absolutely critical.

Senator DOMENICI. Let me just, without distinguishing any of you, just ask you collectively. If we're having problems as you described them here today. What are the recommendations that you have made, just quickly, to fix them. Is there anything we should be doing or somebody not doing their job or why are we having the problems that we're having? Could anybody give me a short summary so that I could get that before I leave here today?

Mr. HANSON. I'm a regulator, so I'm probably not the one to answer that. But I think at least from my own perspective as a regulator it appears to me that there needs to be certainty in the markets, that those who would invest in transmission need to know that they are actually going to be able to pay for that transmission that they invest in. Certainly there are, as was pointed out by Mr. Furman, there are significant challenges when we have a patchwork of laws across the United States and a variety of positions taken by regulators.

There's significant challenges, I would think, to building transmission when it takes longer to get regulatory authority and siting

authority to build that transmission than it does to actually construct the transmission.

Senator DOMENICI. Anybody else want to comment?

Mr. WRIGHT. Senator Domenici, I'll take a shot at that. I'm Steve Wright from Bonneville Power Administration. Before you came in I mentioned that we've spent the last year working on a process to try to allow us to get support from developers that will commit them to spend money to take transmission if we build it. Based on the results that we got yesterday, it looks really good. It looks like we're going to be potentially going on and building some new transmission.

I think our biggest challenge going forward, candidly is explaining to the public why it is we're going to need big, new transmission lines that are going to go through some people's dew sheds. We are going to struggle with that issue. We're going to be on the cutting edge out there in terms of trying to build some new transmission.

The more help we can get in terms of hearings like this, explanation to the public about why it is that this create value for the citizenry as a whole, how we are operating as a Nation and not as a group set of individuals. That's going to make the difference as to whether we're going to be successful in building transmission.

Mr. KAUL. Senator, I would just say that I would agree with both of these gentlemen to my right here. But also add that there's a significant issue with respect to cost allocation and cost recovery for new transmission. It makes the investments risky for utilities and difficult to put together the financing etcetera.

Mr. FURMAN. I would just add, Senator Domenici that I think all three answers illustrate what the fundamental problem is. Mr. Wright operates a system that crosses numerous states. He has the ability to make investments in transmission and allocate the costs across all the consumers in the Pacific Northwest that benefit from them. That's at a good model.

Unfortunately that's the exception rather than the rule. The rule tends to be more in Mr. Hanson's world which is where you have investor owned utilities. They're vertically integrated and so they're regulated at the retail level. If you have the primary owners of the big transmission grids, they're multi-State. So they need to somehow get their different states to agree on a transmission investment.

For some of those states there may be a benefit in the form of economic development, for example. The State of Wyoming has been trying to get transmission built out of it for many, many years, partly for economic development. On the other hand some of the States that those lines would cross will then ask the question well, what's in it for me and their State commissions will say, well, I don't see the benefit.

So I think that that is a big part of the problem that needs to be solved.

Senator DOMENICI. I want to, not having been here I want to comment, Mr. Chairman, on Majority Leader Reid's observations about the bill we're going to vote on this afternoon. That's a very important bill to the industry that is involved in solar and wind

and two or three other of the alternative fuels because it extends the tax credits that are very important.

As a Republican I want to state what we think the problem is, No. 1, we have never voted for—we have voted for all of the extensions. The last time we voted, we voted 88 to 8 to extend them all. They were not paid for. Only when we agreed that they would not need to be paid for did the vote of 88 to 8 occur.

That's the problem now. The House is insisting that for the first time in order to continue these they must be paid for by taxing other people. They have at least got off the idea of taxing other energy sources. But just finding it in the tax code revenues that would offset it is what they think is important.

The Republicans have said we don't need any tax increases for those extenders because we voted for them all already. This is just an extension and they are all readily useable and will readily develop economic—have economic positive results immediately upon adoption. So for those who are waiting around, we're in a deadlock.

The House says unless you put the taxes on we won't have the bill. We say put them on like we've always had and you'll get a bill. We also want to comment that the bill that's being held up has three other things.

It has Davis-Bacon provisions in it. It has lawyer contingency fund provisions in it. Third it has provisions that provide for a $1.2 billion corridor or an electric train of some sort in the city of New York.

We didn't vote for that ever before on a bill that extended these credits. So we're not very anxious to vote for it now. But there's plenty of reasons not to before we get to that.

Having said that, Senator Bingaman, I don't know what you expected to get out of today's hearing. But it was certainly something that turned out to be very, very important. A lot of good information came forward.

Whenever you're trying to solve the problems that you bring before us, it's obvious that there's polarization occurring all over the place. We never want to get that quite involved. It's the Federal Government.

But we did bite off a little bit in the Energy Policy Act that had not ever been taken before by anyone. I was proud of that. I wouldn't count us out if there's too many deadlocks out there where people won't give and won't be reasonable and states won't.

Who knows? The Senate might find a way to solve another problem or two by making ourselves felt in a real way. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much.

I just have one additional question I wanted to put to the panel because Senator Johnson had to leave for another appointment. He asked me to ask you, Commissioner Hanson, in your testimony you explained how localized decisions on siting electricity transmission lines may not always optimize environmental and economic benefits of renewable energy resources. He wanted you to explain or describe any specific instances of projects where regulatory bottlenecks have frustrated the development of electricity transmission infrastructure and then what the consequences of those bottlenecks have been on grid reliability?

Mr. HANSON. That's quite a question.

The CHAIRMAN. Yes. I thought it was a fairly all encompassing question. If you have any response, we'd be glad to hear it.

Mr. HANSON. Certainly. At the risk of starting a war between the states is not my intention, by any means. But certainly there are challenges when one State has certain renewable portfolio standards, for instance and an adjoining State does not or if the legislature passes certain laws which cause a load serving entity to have to build capacity in a particular State.

We have a challenge right now where we have sited a coal plant in South Dakota, as an example. We're attempting to—they are attempting rather to build the transmission for that facility. The load is in Minnesota and there is a protracted siting process in Minnesota that is making it very difficult and making the construction of this plant to be rather tentative.

It's an exciting opportunity with this plant in that, since he asked for an example, in that, there's approximately 150 megawatts of excess capacity for that transmission line which will be used for renewable energy. So when we're looking at—it's also a twin plant to another coal plant adjacent to it. They have agreed to a significant amount of investment to reduce the emissions from both plants so that they will be less than the one plant all by itself. So there's some real benefits there.

However the plant has been approved through the siting authority in South Dakota some time ago and it's taken 3 years to go through the process. It's still in process in Minnesota. So that would be an example.

There are other states that have basically limited what type of power, what type of capacity is permitted to enter their State and it creates some challenges.

The CHAIRMAN. Alright. We appreciate very much the good testimony from all of you. We may have some additional questions that we come to you with.

Thank you very much for being here. That will end our hearing.

[Whereupon, at 11:58 a.m. the hearing was adjourned.]

[The following statement was received for the record.]

STATEMENT OF THE AMERICAN PUBLIC POWER ASSOCIATION

APPA represents the interests of more than 2,000 publicly owned electric utility systems across the country, serving approximately 45 million Americans. APPA member utilities include state public power agencies and municipal electric utilities that serve some of the nation's largest cities. However, the vast majority of these publicly-owned electric utilities serve small and medium-sized communities in 49 states, all but Hawai'i. In fact, 70 percent of our members are located in cities with populations of 10,000 people or less.

Public power systems' primary purpose is to provide reliable, efficient service to their local customers at the lowest possible cost. Like hospitals, public schools, police and fire departments, and publicly owned water and waste water utilities, public power systems are locally created governmental institutions that address a basic community need: they operate to provide an essential public service, reliably and efficiently, at a reasonable, not-for-profit price.

The vast majority of APPA's members are "transmission dependent," meaning that they must pay for access to the bulk transmission system in order to acquire electricity from power plants for distribution. However, a small number of public power systems own a significant amount of bulk transmission—including Los Angeles Department of Water and Power (LADWP) and Nebraska Public Power District, among others.

TRANSMISSION INVESTMENT NEEDED

It is widely recognized that our current transmission system is insufficient and highly constrained. The weaknesses of the grid not only threaten reliability, they undermine the ability of all types of generation, including renewable generation, to get constructed. Transmission improvements increase the overall efficiency and reliability of the system. While improvements could increase the transmission rate paid by an end-user, the same end-user would benefit from increased reliability. Since generation and transmission are linked, the end-user could also benefit from lower-priced generation that would be available with additional transmission access.

Historically, the challenges to improving the grid have been obtaining rights-of-way, environmental concerns about where the transmission lines are sited, and state siting procedures. While these challenges still exist for the most part, one major positive development has occurred in recent years—the enactment of federal "back-stop" siting authority for transmission lines. This authority was granted in the Energy Policy Act of 2005 (EPAct05) in Section 1221, and sets up a process whereby: 1) the Department of Energy designates certain corridors where transmission is highly congested; 2) the Federal Energy Regulatory Commission (FERC) can employ federal eminent domain authority for siting transmission lines if, after a certain period, FERC has found that either state agencies and state compacts have failed to act in exercising their own siting authorities, a state does not have the authority to approve the siting of facilities or to consider the interstate benefits, or the permit applicant is a transmitting utility that does not serve end-use customers in the state of the proposed project; and 3) FERC must take certain issues into consideration when using its siting authority, including that the proposed facilities will: significantly reduce transmission congestion in interstate commerce; protect or benefit consumers; and enhance energy independence. The proposed construction or modification must also be consistent with sound national energy policy.

The mechanics of the siting authority established in EPAct05 have only been finalized in recent months and the first request from a transmission owner for FERC to employ this authority was filed only in the last couple of weeks. APPA believes that the thoughtful use of FERC's authority in this area will improve the bulk transmission grid over time. We have been disheartened that some in Congress have sought to repeal this authority, but are encouraged that they have not been successful to date.

JOINT OWNERSHIP WOULD IMPROVE TRANSMISSION INVESTMENT

Encouraging proportional joint ownership of transmission facilities by those load-serving entities, like public power utilities, providing service in a given region is another way to get more transmission built. If the responsibility for building and owning the transmission grid is spread more broadly among entities serving loads (i.e. demand) in a region, then joint transmission planning will be facilitated, simply because there are more participants at the planning table. If network customers of a dominant regional transmission provider are encouraged to buy in to their load ratio share of the transmission system, transmission usage and ownership will be more closely aligned, and the frictions between transmission-dependent utilities and transmission owners can be reduced.

Public power utilities have participated in jointly-owned transmission arrangements for many years. One model of joint ownership that has worked for public power is investment in a transmission-only company. A second model is ownership in a shared system. There are two transmission-only companies that are partially owned by public power utilities. These are the American Transmission Company in Wisconsin and the Vermont Electric Power Company. In shared or joint transmission systems, two or more load-serving utilities combine their transmission facilities into a single system. Examples of public power participation in shared transmission systems are found in Indiana, Georgia, Minnesota, and the upper Midwest region.

One impediment to expansion of joint ownership is the "private use" restriction imposed on tax-exempt financing that is discussed in more detail below. While other types of financing mechanisms are used where private use restrictions apply, this situation is not ideal from a parity standpoint with investor-owned utilities that have federal financial incentives at their disposal for building new transmission.

REGIONAL PLANNING IS ESSENTIAL

Transmission improvements will be made where there is the greatest benefit to the regional system as a whole. Because of the physical properties of electricity, an improvement at one point in the regional system can increase the efficiency in a dif-

ferent part of the region. Historically, utilities have made transmission-building decisions based on where the greatest benefits would occur, and these decisions typically have been made in consultation with other regional utilities. This is doubly true because of the political and policy barriers to transmission siting delineated above. Successful regional planning has occurred throughout the country as several of the witnesses at this hearing have shown, but not at the pace or volume necessary to meet demand for electricity while maintaining high reliability.

Regional planning and support from a broad array of stakeholders is equally important to siting transmission to renewable facilities as it is to traditional base load power plants. The major difference between base load power plants and some renewable generation facilities is that often renewable plants, like wind projects, for example, must be sited remotely from population centers because that is where the wind blows, etc. So, an added challenge to siting transmission lines to most renewable facilities is the length of the lines and the remoteness of the locations. Public power systems, like LADWP, have taken a lead role in promoting transmission projects to renewable facilities. Two LADWP transmission projects are in the planning phases that will enable southern California to access thousands of megawatts of new renewable generation capacity. One of these projects is a joint ownership arrangement as noted below:

(1) Barren Ridge Renewable Transmission Project: This project consists of construction of new 60 mile double-circuit 230 kV from a newly constructed Barren Ridge substation to a proposed new substation called Haskell. The project also includes reconductoring existing 230 kV line. This project will allow access to over 1200 MW of wind and solar generation resources in the Tehachapi and the high desert by Mohave. The project is in the environmental and permitting process and the first phase of the project is expected in 2012.

(2) Green Path North Project: This project consists of the development of an approximately 100 mile high voltage transmission line for the Coachella Valley area to the Hesperia area in Southern California. The transmission system will be interconnected to the Imperial Irrigation District (a public power system), LADWP, and Southern California Edison (an investor-owned utility). The purpose of the project is to provide access to the vast geothermal and solar resource potentials in the Imperial Valley. Development work including preliminary engineering and environmental studies are underway. Depending on various factors, the project is expected to be in-service by 2013.

CONCERNS WITH FEDERAL MANDATES TO BUILD RENEWABLE TRANSMISSION LINES

Until most non-hydropower renewable energy can be used reliably at anytime (as opposed to intermittently when the wind blows or the sun shines), base load generating plants like those powered by large-scale hydropower, natural gas, nuclear energy, and coal must be used to produce electricity and to "firm up" the renewable resource. With that in mind, legislative initiatives that would mandate 75 percent renewable usage for a given bulk transmission line are not feasible from a reliability standpoint. Furthermore, once these lines interconnect to the rest of the grid, such a requirement would be extremely hard to determine. The laws of physics are such that electrons will flow where they will, and new high voltage additions could well change transmission system configurations substantially, causing changed power flows—some of which would be non-renewable—that even the engineers did not anticipate in advance.

In addition, the variability of generation availability and transmission assets from region to region dictates the need for regional, rather than national, solutions. Even the federal back-stop siting authority that APPA strongly supports envisions extensive state and regional planning before the federal government has a role. And, many of the witnesses at the hearing, including Steve Wright of Bonneville Power Administration (BPA), Rich Halvey of the Western Governors Association, and Bryce Freeman of the Wyoming Infrastructure Authority, have provided excellent examples of significant actions to access renewable energy at the state and regional levels. APPA members have participated in and will continue to participate in the types of initiatives discussed by these witnesses as well as others initiated by public power entities like LADWP.

We have strong concerns about congressional mandates to build transmission to certain types of generation sources when the focus should instead be on getting transmission built, period. We are especially concerned about mandates on the federal transmitting entities, like BPA, the Western Area Power Administration, and the Southwestern Power Administration, as their 70 year mission and contractual obligation to their customers is to market federal hydropower—a mission that is difficult enough to perform on its own.

LIMITS ON THE USE OF TAX-EXEMPT FINANCING

Traditionally, our federalist system of government has respected the right of state and local governments to pursue activities that are in the public interest and the interest of the citizens they serve. Congress has promoted and protected the right of government to issue municipal bonds for "government owned and operated projects and activities." Public power systems are just that—government-owned and -operated systems similar to other local infrastructure projects such as water systems, prisons, hospitals, and transportation lines.

While outside the scope of this committee's jurisdiction, we believe and want to emphasize that Congress should continue to recognize that a basic tenet of the federal system of government is the constitutional doctrine of reciprocal immunity, under which the federal government cannot tax the interest on obligations issued by state and local governments for public purposes and state and local governments cannot tax the interest on federal obligations.

In addition to continued access to tax-exempt bonds to finance electricity infrastructure, it is important that Congress provide adequate flexibility in the ability of public power utilities to partner with private entities in the financing and use of certain facilities, as is discussed above. Congress has recognized this necessary flexibility by allowing a certain amount of "private use" from output facilities financed with tax-exempt bonds. Prior to the 1986 Tax Reform Act, the limitation on private use was set at 25 percent for all governmental issuers. However, the 1986 legislation reduced the amount of private use to 10 percent. In addition to the reduction of the private use limitation from 25 percent, the federal tax code also provides that for certain output facilities—public power and public natural gas generation and transmission facilities—the private use limit is the lesser of 10 percent or $15 million. Private use restrictions limiting the benefits available to private entities from publicly financed facilities are based on sound and appropriate public policy considerations. However, the restrictions should apply equally to all governmentally financed and operated facilities.

The special $15 million private-use limitation that applies only to publicly owned electric and gas facilities is not supported by any public policy justification. It may force local governments that provide transmitting facilities to have their surplus capacity sit idle rather than having it sold to others in order to avoid the private use limitation. This provision should be repealed because it is discriminatory and it encourages practices that are neither environmentally nor economically sound. It also discourages an expansion of the joint ownership model that has been so successful in some regions, and could be used to improve the bulk transmission system in others.

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

DEPARTMENT OF ENERGY,
Washington, DC, September 19, 2008.

Hon. JEFF BINGAMAN,
Chairman, Senate Energy & Natural Resources, U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: On June 17, 2008, Kevin Kolevar, Assistant Secretary, Office of Electricity Delivery and Energy Reliability, testified regarding examining the challenges and regional solutions to developing transmission for renewable electricity resources.

Enclosed are the answers to 10 questions submitted by you, Senators Domenici and Johnson to complete the hearing record.

Sincerely,

LISA E. EPIFANI,
Assistant Secretary, Congressional and Intergovernmental Affairs.

[Enclosures.]

RESPONSES TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. It strikes me that the most difficult issues that we face in getting transmission built are those of siting and cost allocation. Both are complicated by the fact that long-distance transmission must be built through several states and so across several jurisdictional boundaries. How do you envision a multi-state approach to siting working, and what regulatory framework would be required to sustain it?

Answer. Ideally, when an application to site a major multistate line is filed with one or more States, a working group with representation from all of the affected States, and Federal agencies when federal lands are involved, would be convened. This group would establish a common list of information requirements needed to evaluate the proposed project, and to the extent possible agree upon a common schedule for the parties' respective reviews. Thus, the reviews would be done in parallel, on a coordinated schedule and working from a common information base.

To date, no projects have been addressed in this way, largely because no such projects have yet been formally proposed. This voluntary process, however, appears quite relevant to some of the major multistate projects now being discussed in both the West and in the Midwest Independent System Operator area. If this process proves effective, it could be replicated in other regions. DOE would also be happy to work with the States in other regions to establish such protocols now, before actual proposals are ready for review.

Question 2. Your zones are described as areas that contain the resources. The purpose of cost allocation—who bears what share of the cost—it would seem that the zones need to include the load centers since it is the customers who are buying the electricity who ultimately will pay for the transmission. How do you see resolution of this problem working?

Answer. In most cases it is not yet clear which load center markets would be served by which resources, and thus it would be difficult for the Western Governors Association (WGA) to include load centers into their Western Renewable Energy Zones (WREZs) at this point.

WGA's project does include later phases after the Phase 1 Renewable Energy Zone Identification that will attempt to resolve some related issues of transmission planning, which specifically addresses which load centers would buy the WREZ electricity, and the allocation of costs.

Cost allocation, however, is a responsibility of the Federal Energy Regulatory Commission.

RESPONSES TO QUESTIONS FROM SENATOR DOMENICI

Question 1. Is the Department's ongoing effort with WGA on planning limited to renewable generation resources? Could it be applicable to other clean energy sources?

Answer. The current WGA effort on Western Renewable Energy Zones is limited to renewable generation resources. However, it could be applicable to other clean energy sources as well should the Steering Committee choose to make it so. The Department has helped and is currently helping WGA on a range of regional electricity planning issues outside of the Western Renewable Energy Zones effort, concerning both renewable and non-renewable, clean energy sources. Moreover, the Steering Committee Charter for the WREZ initiative clearly states this effort is to complement other work WGA is doing to advance clean energy in the West.

Question 2. You testified that limiting planning efforts to only the state infrastructure level decisions. Is there recognition at the state level regarding the need for regional transmission planning? Are some areas of the country moving forward with regional planning while other areas are not?

Answer. I think there is broadening awareness of the need for regional-scale transmission planning, among the States and across the electricity industry. The Federal Energy Regulatory Commission's requirement under Order 890 for regional-scale transmission planning is prompting some of the awareness.

However, there are still two major hurdles at the State level in regards to regional transmission planning. One is that the transmission planners are often stymied by uncertainties about where the new generation resources are likely to be located, so it is not clear where the new transmission will be required. Regional groups of States need to develop more coordinated concepts about what amounts of new generation, using what resources, they would like to see developed where—and with energy efficiency programs included in the process.

The second problem is that there are many "seams" problems at the boundaries between Regional Transmission Organizations (RTOs), Independent System Operators, and the areas that do not have centrally organized markets. Many of the most significant transmission constraints exist at these seams where differences in planning and operational practices inhibit the development of effective solutions. Seams issues have bedeviled the industry and its regulators for many years. Although some progress has been made, the problems today seem more severe because the industry is now seeking to move larger amounts of energy across regional boundaries.

Question 3. DOE is to be commended for working with the WGA on this collaborative regional effort. Clearly this Western Renewable Energy Zones process is a multiyear undertaking. Will this project continue with the change in Administration next year or will all this hard work be lost?

Answer. DOE has worked productively with the WGA under several Administrations. I see no reason why this effort will not continue.

Question 4. The Department recently formed the Electricity Advisory Committee (EAC) and held its first meeting in May 2008. Will the EAC be examining similar issues with regard to renewable energy generation and transmission?

Answer. The Committee has undertaken an analysis of the major issues associated with maintaining an adequate electric infrastructure in the face of the multitude of new challenges such as siting difficulties and likely carbon-constraints. I expect that key issues pertaining to renewables and transmission will be addressed in their report.

Question 5. Most of the hearing testimony emphasizes the benefits of a collaborative regional process to address the critical need for transmission infrastructure for a number of reasons, including reliability and the need to transmit alternative energy sources. Mr. Pickens, however, insists that these collaborative frameworks are—at several years—too lengthy and that the country can't wait that long. Do you agree with Mr. Pickens? Is there any way to expedite or streamline these efforts?

Answer. Our existing institutions may function reasonably well if there is a clear sense of urgency about the need for timely and effective action. There is a much broader appreciation today of the need for transmission additions than there was three years ago. A lot of important work is being done on a regional basis today, and I hope that in a few years we will find that we have made substantial progress. If not, we may need to think about some institutional changes.

Question 6. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. It would be technically difficult to implement such a mandate—as this runs counter to the laws of physics that dictate how AC transmission lines work—

and it would also tend to erode one of the principal benefits of transmission, which is to enable the most efficient use of a region's entire generation fleet. Transmission facilities are very long-lived assets. Once such facilities are in place, it is difficult to anticipate how to use them to the region's best advantage in the face of ongoing changes in fuel prices, patterns of economic activity, natural disasters, and other events. A robust transmission network makes the electricity infrastructure more flexible and resilient in the face of such changes, and we need to enhance that flexibility, not restrict it.

RESPONSES TO QUESTIONS FROM SENATOR JOHNSON

Question 1. Recently the state of South Dakota approved a large generation resource and associated interstate transmission project. The interstate transmission lines have been identified by the regional transmission organization as the least cost alternative for interconnection of the resource. The regional transmission organization has also described the transmission grid in that area as "severely restricted." The transmission facilities will also support the interconnection of renewable resources. In this case, the state of Minnesota which has had the application to build these lines before it for three years has not yet taken any action.

In instances such as these, where one state frustrates the development and approval of transmission lines, what authorities does the Department of Energy have to address these issues?

Answer. The Energy Policy Act of 2005 amended the Federal Power Act to create a procedure that could be used if necessary to deal with situations in which neighboring States are unable to agree on the siting of a regionally beneficial transmission facility. The Act directed DOE to publish an electric transmission congestion study every three years, starting in August 2006; the Department is now making plans for its 2009 Congestion Study. As amended, the Federal Power Act further authorizes DOE to designate such areas as it considers appropriate as "national interest electric transmission corridors" (National Corridors), based on its congestion study, comments received from the States and other stakeholders, and other relevant information.

In turn, the Act also authorizes the Federal Energy Regulatory Commission (FERC), in certain situations, to exercise jurisdiction to site and issue permits for the construction of transmission facilities that would ease transmission constraints within designated National Corridors. At present, this area of the country is not identified as a National Corridor. For that reason, the FERC has no authority to act under the provisions of section 1221(a) of the Energy Policy Act of 2005. Should a future National Corridor be designated which covers this area, FERC would have the authority to consider whether an application for construction of such a line was in the national interest irrespective of State (in)action.

Question 2. Recently the state of South Dakota approved a large generation resource and associated interstate transmission project. The interstate transmission lines have been identified by the regional transmission organization as the least cost alternative for interconnection of the resource. The regional transmission organization has also described the transmission grid in that area as "severely restricted." The transmission facilities will also support the interconnection of renewable resources. In this case, the state of Minnesota which has had the application to build these lines before it for three years has not yet taken any action.

What recommendations would you have for improving or expediting federal approval for the siting and approval of interstate transmission projects?

Answer. I recommend that the process established by the DOE to implement the electricity title of the Energy Policy Act of 2005—a process in place for less than a year—be allowed to work for a few years before we consider making changes.

Using the authority provided by the Energy Policy Act, DOE designated two National Corridors in October 2007, one in the Mid-Atlantic—New York area, and one in Southern California also covering some of Arizona. The intent of these designations was to underscore the importance of addressing transmission congestion problems in these areas, as opposed to prescribing the solutions. The States still have primary responsibility for dealing effectively with these problems, but if they do not do so, would-be transmission developers may request FERC to exercise siting responsibility.

This arrangement gives the States strong incentives to work with their neighbors to resolve transmission issues. At the same time, I expect that DOE will continue to designate National Corridors where they are needed to ensure that major transmission problems receive appropriate attention.

DEPARTMENT OF ENERGY,
Washington, DC, September 19, 2008.

Hon. JEFF BINGAMAN,
Chairman, Senate Energy & Natural Resources, U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: On June 17, 2008, Stephen J. Wright, Administrator, Bonneville Power Administration, testified regarding examining the challenges and regional solutions to developing transmission for renewable electricity resources.

Enclosed are the answers to 11 questions submitted by Senators Domenici and Smith to complete the hearing record.

Sincerely,

LISA E. EPIFANI,
Assistant Secretary, Congressional and Intergovernmental Affairs.

[Enclosures.]

RESPONSES TO QUESTIONS FROM SENATOR DOMENICI

Question 1. BPA started adding wind resources to its system about a decade ago. Initially, Bonneville was able to use the federal hydropower system to shape the load but I understand that this is no longer possible due to competing non-power demands on the hydropower system. Please elaborate.

Answer. The Columbia River serves multiple purposes besides power generation, including flood control, irrigation, and navigation as well as fisheries mitigation and enhancement. These purposes have system operation requirements that limit the optimization of river operations for power generation.

The recent growth of wind generation in BPA's control area comes at a time when the federal hydropower system is being further constrained by storage and operation requirements to facilitate anadromous fish migrations. Those requirements, established in response to the Northwest Electric Power Planning and Conservation Act of 1980 and the Endangered Species Act of 1973, prescribe periods of time when water must be spilled, rather than run through dam turbines, and flow volume requirements that must be met through seasonal reservoir storage.

These spill and storage operations have reduced the flexibility of the hydropower system to meet peak demands and to follow load. As your question points out, this was not as much of a concern when wind generation began to be added to BPA's control area. Now, with 1,500 MW of wind generation that can appear or disappear quickly, BPA's hydropower system that operates at an average of 9,000 1 MW is straining within the non-power constraints to fill in for the intermittent wind.

We are continuing to actively seek solutions to this challenge that facilitate the growth of the wind resource while keeping the cost of integrating wind output with the rest of the generation system as low as possible, and while also meeting system reliability and fish protection requirements. Currently, the primary venue for this effort is the Wind Integration Team which we committed to form and fund as part of a recent rate case settlement.

Question 2. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. Limiting a transmission line to carry only renewable energy would likely undermine the cost-effectiveness of construction. The ability of a line to support a diversity of resources would improve its capacity factor and its cost recovery and would also be consistent with electric transmission open access policies.

Question 3. The intermittent nature of renewable resources like wind present some challenges. How far off are future technological advances, such as electricity storage and better wind forecasting, which could help address some of these challenges?

Answer. Accurate wind forecasting is available today only over an extended time period; for example, expected average output over a year. Utilities operate from what is often called "real time," which means the actual operating hour that wind is occurring (the time domain of a transmission operator or regional transmission organization) to next hour and a day ahead (and longer) that is the time domain of the generation side of a utility or Independent System Operator (ISO).

Accurate within the hour "real time" wind forecasts are not yet commercially available. These forecasts are about being able to anticipate sudden changes in wind generation. Large changes in wind energy are difficult to predict but are important for effective integration of wind operations and utility operations. The lack of forecast capability, when the wind is currently generating, has led to transmission operators increasing the amount of reserve generation. This has increased the integra-

tion costs for wind to connect to the grid to serve a contracted load. Several United States and European wind forecast vendors are developing prototype systems to forecast wind within the hour. Research supporting this development is being sponsored by BPA, DOE, California, and the European Union.

Wind forecasts for the next operating hour and operating day are improving. However, wind behavior is peculiar to regional geography (coastal, central, mountain), global wind influences (trade winds, jet stream), and terrain (river gorges, mountains, plains). An accurate wind forecast system that may work well in the Midwest (for example) may not work all that well if applied to California. Regardless, wind forecasts a day ahead have become more accurate from what were available several years ago. An important note—day in advance wind forecasts are only able to forecast hourly average wind, which may have little benefit to manage wind within the hour—the time domain of the transmission operator.

Pumped storage (water) remains the storage leader for utility-scale application. However, it has locational and environmental issues. BPA's Office of Technology Innovation has a 2007 comprehensive study on utility energy storage systems that may be the most up to date assessment of utility scale energy storage systems. We have included it as an attachment to our response (Attachment 1).

Prototype utility-scale energy storage devices are currently under development and field testing. The broad application of energy storage to support renewable intermittency has yet to be achieved. The challenge is finding a technology that can fully charge and discharge tens of megawatts several times in every 10 minute period to support intermittency, and yet have sufficient life to recover costs and earn a rate of return. Several utility-scale systems are currently in service in the USA, but they are small and only economic when applied in specific situations.

BPA's Technology Innovation Office, in partnership with DOE's Office of electricity Delivery and Energy Reliability (OE), DOE National Laboratories, and The state of California is in the second year of a three year research effort to see if flywheel technology can be scaled up to meet the wind integration demands. Several other storage technologies are showing promise such as Sodium Sulfide (NaS) batteries.

Further, DOE is developing an integrated energy storage program to meet the evolving needs of the electric power grid through OE's Energy Storage and Power Electronics program, in collaboration with the Office of Science. OE currently supports several grid demonstrations of various applications of energy storage, including compressed air, super-capacitors, flywheels, and batteries.

Question 4. With the National Interest Electric Transmission Corridor process established in EPAct 2005, Congress sought to address the critical issue of transmission siting. However, at this time, these provisions haven't been fully implemented and.no line as been sited pursuant to EPAct. Nevertheless, the NIETC process has been contentious.

I was surprised then to read some testimony—including that from Mr. Pickens and Mr. Freeman with the WIA—that suggested these Energy Policy Act authorities did not go far enough. Mr. Pickens goes so far as to call on Congress to provide FERC with exclusive jurisdiction to site new transmission for a renewable project. Please comment.

Answer. The currently designated National Interest Electric Transmission Corridors are in other parts of the nation than the Pacific Northwest. BPA has been able to site new transmission lines successfully in this region, including recent major additions of 500-kV capacity.

BPA's statutory authorities allow it to acquire interests in land to site transmission lines, including the authority for eminent domain. BPA has been able to site new transmission lines in the Pacific Northwest working through public processes with federal, state, tribal and local governments as well as private landowners. We have also been able to construct transmission in sensitive environmental areas. For example, we were able to construct new transmission reliability in the City of Seattle's watershed, winning the support of the City Council and environmental groups. BPA does not have a position on additional transmission siting authority for FERC.

Question 5. BPA's Open Network Season was a tremendous success. What are your next steps?

Answer. BPA was pleased by the customer response to its first Network Open Season. By June 27, 27 customers had provided security deposits for 153 Precedent Transmission Service Agreements (PTSA) for a total of 6,410 megawatts (MW) of service. Most of those PTSAs were associated with wind development.

Now that BPA has received the security payments, it will determine what existing long-term firm capacity can be granted to the PTSAs and begin the cluster study to evaluate transmission needs and facility requirements where capacity is not

available. Once the cluster study is complete, then BPA will know what transmission facilities are needed to meet the requests for service. BPA will use its financial model to evaluate the results of the cluster study to determine the potential rate impacts. BPA will need to complete all National Environmental Policy Act requirements before starting new construction.

RESPONSES TO QUESTIONS FROM SENATOR SMITH

JOE IMPLEMENTATION

Background

In 2000, Congress passed the Joint Operating Entity (JOE) legislation (PL 106-273) which amended the Pacific Northwest Electric Power Planning and Conservation Act. This 2000 Act requires the Bonneville Power Administration (BPA) to sell preference power to a qualifying JOE. The intent of the Congress was to establish a new type of eligible preference customer, a JOE, which could aggregate its members' contracts for the purchase of power from BPA into a single contract. Congress wanted the JOE and its member utilities, which are preference customers of BPA, to have the opportunity to join together to meet their retail load power needs in a more efficient, cost-effective manner. In BPA Administrator Judith Johansen's 3-29-00 response to Rep. John Dingell's 1-19-00 letter regarding the JOE legislation, the Administrator stated "(g)enerally, customers might realize such benefits as reduction in administrative staff, reduction in legal fees, combinations of operations and maintenance work, or optimized use of the interconnected transmission and distribution systems. Pooling would also provide the utilities with greater opportunity to better manage the use of, addition to, or sales from non-BPA resources than they could individually." Pooling of geographically diverse loads and resources under one contract is one mechanism for a JOE to optimize the use of the interconnected transmission system; for example, sinking resources to its geographically diverse load is one way to minimize transmission costs.

As the region moves forward with new long-term contracts, one primary goal of the Regional Dialogue is to encourage utilities to develop resources. "Having willing utilities responsible for resource acquisition decisions also enhances competition in the marketplace and spreads risk." (Regional Dialogue Policy, page 6)

Question 1. How does BPA's Regional Dialogue process, including the Tiered Rates Methodology and the new Regional Dialogue power contracts, facilitate a JOE's ability to develop new power resources?

Answer. Ensuring adequate infrastructure development is one of our primary goals in the Regional Dialogue contracts. In line with that goal, we have focused intently on making it practical for our customers to develop their own resources to meet their load growth. The new Regional Dialogue contracts and Tiered Rate Methodology (TRM) will facilitate a JOE's ability to develop new power resources in a number of major ways. First and foremost, they will remove a barrier that would otherwise be nearly insurmountable—BPA's past practice of meeting customers' load growth at melded rates. When new resource costs are far in excess of BPA melded rates, this practice makes resource development by customers economically impractical. Second, BPA is offering to provide at-cost services to back up and reshape the output of customer-acquired resources, making it much easier and more practicable for customers to add their own resources. Third, BPA has agreed to pay for transmission of customers' new resources over third party transmission systems. Fourth, BPA has committed to not use its existing system resources to advantage its own sales of power for load growth over customers' own resources. Fifth, BPA has taken steps to give customers ample time to decide between adding their own resources and buying from BPA to meet their load growth, so they are not rushed into making a choice. Sixth, BPA will provide flexibility in how customers schedule power from their own resources to their loads, in order to reduce the delivered costs of those resources, so long as these flexibilities do not create costs for other customers. These are just some of the steps BPA is taking to facilitate resource development by a JOE, and by other customers.

Question 2. The 2000 Act states that BPA 'shall' sell wholesale power to a JOE. How is BPA implementing the various components of the Regional Dialogue to ensure the statutory benefits of the JOE legislation intended by Congress remain intact?

Answer. As a qualified customer of BPA, a JOE will continue to be able to purchase an amount of power for its members' aggregated load service from BPA, similar to how BPA currently sells power to PNGC Power (PNGC), which is the only JOE with which we have a contract now. We have invested substantial time and effort into minimizing the extent to which Energy Northwest bond requirements

constrain PNGC's future purchase relationship with us, and believe that effort has been largely successful. We are now in the midst of intensive efforts to work out contractual and rate provisions as they apply to PNGC and other JOEs, so it is premature to answer this question definitively, but we are seeking to preserve the statutory benefits of JOE status under the new contractual relationship and expect to be successful.

Question 3. Do BPA's Regional Dialogue scheduling policies advance the goals of PL 106273 and the Regional Dialogue, regarding resource development? And are they consistent with how BPA treats its own resources, that is, in the most efficient and cost-effective manner possible?

Answer. Yes, we believe the approach to resource scheduling in the Regional Dialogue is consistent with PL 106-273 and the Regional Dialogue. Specifically, BPA is offering scheduling services on behalf of customers who add their own new resources, thereby removing one of the primary potential barriers to customer resource addition. We have also indicated to PNGC, that we will provide them scheduling flexibility for their new resources, limited only by the need to ensure that it does not impose costs on other BPA customers. We must also ensure that the scheduling policies/provisions ensure that implementation of the agreement is workable, though we do not expect that to be a significant impediment. Given the importance you place on this matter, we will highlight this issue in the contract negotiations with PNGC and other customers, who could be impacted by the offering of the services.

This treatment may not be entirely consistent with how BPA treats its own Tier 2 resources because BPA must deliver those resources to preference customer loads wherever they are located, and cannot necessarily avoid incremental scheduling challenges across constrained paths by netting new resources against existing load.

RESIDENTIAL EXCHANGE PROGRAM

BPA has drafted a proposal in which preference utilities will be asked to give up their right to exchange power under the Residential Exchange Program (REP) (established by section 5(c) of the Regional Act), in order to sign new Regional Dialogue contracts. Without rights to participate in the REP, the economics of new resource acquisition and development by preference utilities is dependent on the continuing existence of tiered rates during the term of the contract.

Question 1. What assurances can BPA give to those utilities that sign Regional Dialogue contracts and forego their exchange rights that there will be no melding of Tier 1 and Tier 2 costs during the contract term (2028) and that there will be a transparent separation of Tier 1 and Tier 2 costs?

Answer. In the Tiered Rates Methodology BPA set forth a number of principles that guide the allocation of costs. In particular, Principles 2 and 3 provided as follows:

> Tier 1 Costs will be kept separate and distinct from Tier 2 Costs. Tier 1 Costs will be recovered through the Tier 1 Rates. Tier 2 Costs will not be recovered through the Tier 1 Rates except when necessary to ensure BPA's cost recovery during the Rate Period or to conform to court order.
>
> Individual Tier 2 Cost Pools are to be kept separate from one another; customers paying the cost of one Tier 2 Cost Pool will not be responsible for paying the cost of another Tier 2 Cost Pool.

BPA's intent in determining the costs included in individual Tier 2 Cost Pools is that the costs and cost of risk faced by each customer that elects a particular Tier 2 Rate Alternative will reflect BPA's incremental cost of serving the customer and will be comparable to the types of costs and risks the customer would face if purchasing from a non-Federal source.

These principles are being implemented through extensive provisions in the TRM. BPA has expended extensive effort to give customers the greatest possible assurance that these TRM provisions will be observed for the full duration of the new contracts. Sections 12 and 13 of the draft TRM are largely devoted to providing customers with protections against changes in these TRM provisions over the 20-year life of the contracts, as are related sections of the draft contracts.

While we believe these provisions provide substantial protection against Tier 2 costs migrating to Tier 1, we always reserve the right to collect otherwise unrecoverable costs in Tier 1. This is necessary to assure that U.S. taxpayers are not burdened with inappropriate costs.

Question 2. During the term of these contracts, does BPA plan to combine the costs of new and existing resources, offer melded rates, or allow other preference customers to exchange new resource costs with BPA?

Answer. BPA does not plan on combining the costs of new and existing Federal resources when it sets its power rates, except for an identified and very limited amount of resources acquired to augment the Federal system, as defined in the July 2007 Regional Dialogue Policy. Beyond this limited augmentation, the costs of energy from Federal resource acquisitions made after September 30, 2006, will be allocated to particular Tier 2 cost pools and will not be added to the set of Tier 1 System Resources.

BPA will provide Load Following customers with a limited opportunity to select a Shared Rate Plan (SRP). Participants in this plan will be subject to the same tiered rate structure as other customers, but their bills will be averaged after charges are calculated for each customer. BPA plans on limiting the participation in the SRP to less than 10 percent of total preference sales.

Under the Regional Dialogue contracts, there is no provision that would allow preference customers to exchange the costs of new non-federal resources with BPA. Customers who wish to exchange the costs of new resources will not have the opportunity to sign a Regional Dialogue contract, and would not receive a high water mark. Such customers would be offered a contract at some point in the future. The terms and conditions of such alternative contracts have not been defined, in part because of the expectation that all or virtually all customers will sign the Regional Dialogue contracts.

Question 3. What options has BPA examined to allow preference customers to retain exchange benefits?

Answer. BPA believes that the ability to exchange resources under the Residential Exchange Program is incompatible with the concept of tiered rates, and is likewise incompatible with the customers' strong desire to keep the costs of the resources BPA acquires for service at the Tier 2 rate out of the Tier 1 rate. In the Regional Dialogue Policy BPA stated:

> The cornerstone of the Regional Dialogue Policy is to limit BPA's sales of firm power at the lowest cost-based rates to approximately the firm capability of the existing Federal system. Customers may purchase additional Federal power, but it will be priced at a Tier 2 rate based on the marginal cost of serving the additional load. The costs of power acquired to serve load subject to a Tier 2 rate will be kept as low as possible; however, BPA will not subsidize Tier 2 rates to create a financial advantage over a non-Federal resource.
>
> This goal of keeping the costs of new resources separate from the costs of the existing system would be thwarted if customers' higher-cost new acquisitions were to flow back to the Tier 1 rate through the Residential Exchange Program.

RESPONSES OF BRYCE FREEMAN TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Do we need to change something in legislation to accomplish what you think needs to be done about the federal backstop siting authority? If so, what changes do we need to make?

Answer. No, we believe the 2005 Energy Policy Act provides sufficient authority. However, in the West we believe it would be appropriate for the Department of Energy to define congestion more broadly than it currently does, for purposes of designating electric transmission corridors of national interest. For example, DOE could consider areas that are determined to be Western Renewable Energy Zones and the transmission corridors that need expansion in order to deliver these renewables to be corridors of national interest. There are many other examples in the west where congestion would exist if new generation was brought on to the system. This imminent congestion is not adequately taken into account by the DOE under its current practice.

Question 2. How is the process working to get siting permits in the states that you are working with?

Answer. We are currently involved in TransWest Express, a project that will require siting in Wyoming, Utah and Nevada. An application has been filed and the Bureau of Land Management has been designated the lead agency. We are very early in the process. At this point our relationships with the regional land management agencies are excellent. In addition, the three Governors have agreed to implement provisions of a transmission siting protocol that was adopted by Western Governors; this process will help to ensure close coordination among the state and federal agencies.

Question 3. How are you allocating the costs for your projects? Is it made easier by the fact that a state agency is involved?

Answer. First, the Wyoming Infrastructure Authority is an instrumentality, not a state agency. In the projects we are involved in, we are exploring business models that are alternative to the traditional, vertically-integrated utility rate-base model. We are hoping this innovation will help break through some of the cost allocation barriers.

For example, the Wyoming Colorado Intertie is conceived as a merchant line with capacity sold through a FERC sanctioned open season auction. Costs of the line will be allocated through this process.

For the TransWest Express project, we are exploring the use of an anchor tenant model, in which electric generation producers would commit to capacity on at least some of the line's capacity during the initial stages of development. Under this approach a significant fraction of the costs would be allocated to these anchor tenant customers. Additional capacity would likely be offered through an open season, much like the Wyoming Colorado Intertie example above.

Question 4. Do your projects fit into a regional planning framework? If so, how did that framework develop?

Answer. Yes. The regional planning blue print for our current projects included a comprehensive plan that was sponsored by Governor Freudenthal and then-Governor Leavitt in 2004—the Rocky Mountain Area Transmission Study. Our projects are also included in WECC's ongoing regional and sub-regional planning framework.

RESPONSES OF BRYCE FREEMAN TO QUESTIONS FROM SENATOR DOMENICI

Question 1. The WIA started its planning process back in 2004 and already has underway a number of transmission projects. Is the WIA also participating in the Western Renewable Energy Zone process spearheaded by the Energy Department and the Western Governor's Association? If so, how are you coordinating these two efforts?

Answer. Yes, we will actively participate in the Western Renewable Energy Zone process. While this effort is just getting underway, we anticipate that Wyoming's high quality wind resource will be identified as a WREZ, and that the transmission projects we are developing, and likely additional transmission needs beyond our current projects, will be identified as transmission needed to facility the delivery of Wyoming wind to load centers in the West.

Question 2. Is the WIA process focused solely on renewable resources or are you also looking at alternative clean sources of energy?

Answer. There is a significant effort in Wyoming to foster the development of clean technologies that will utilize Wyoming's abundant coal resource. The WIA is a part of this effort. In 2006, the State Legislature expanded WIA's mission to include the promotion of advanced coal electricity generation. The WIA formed a partnership with PacifiCorp to explore the feasibility of locating a commercial-scale integrated gasification combined cycle (IGCC) facility in Wyoming. As part of this partnership we have been petitioning the Federal Government to appropriate funds to implement Section 413 of the 2005 Energy Policy Act—which authorizes DOE to fund the development of a western IGCC demonstration project at altitude, including the capability to capture and sequester carbon dioxide emissions. For a number of reasons, including lack of federal funds, this partnership has been put on hold. WIA remains interested in pursuing alternative clean sources of energy.

Question 3. You testified that FERC needs to allow experimental business models like the WIA has done in embracing innovative development tools, like open seasons and anchor tenant models. Please explain how these tools work in practice. Also, in your opinion, why hasn't the Commission been receptive to approving such models?

Answer. The open season process is a FERC-sanctioned business model. See the answer to Senator Bingaman's question # 3 for a brief description of how this tool works in practice.

Applying the anchor tenant model to a transmission project will require approval from FERC. Since this model is used regularly in pipeline regulation, and given some of the characteristics of the TransWest Express Project, we are hopeful that FERC will be receptive to approving the model.

Question 4. Most of the testimony today emphasizes the benefits of a collaborative regional process to address the critical need for transmission infrastructure for a number of reasons, including reliability and the need to transmit alternative energy sources. Mr. Pickens, however, insists that these collaborative frameworks are—at several years—too lengthy and that the country simply can't wait that long.

Do you agree with Mr. Pickens? Is there any way to expedite or streamline these efforts?

Answer. The process for planning and developing a transmission line is lengthy. For our projects, we have a sense of urgency as well as a since of good coordination among federal and state agencies. Please see my answer to Mr. Bingaman's question # 2 above. We do think the NIETC process could be expanded, in conjunction with the pending WREZ initiative.

Question 5. With the National Interest Electric Transmission Corridor process established in EPAct 2005, Congress sought to address the critical issue of transmission siting. However, at this time, these provisions haven't been fully implemented and no line as been sited pursuant to EPAct. Nevertheless, the NIETC process has been contentious.

I was surprised then to read some testimony—including your testimony and that from Mr. Pickens—that suggested these Energy Policy Act authorities did not go far enough. Mr. Pickens goes so far as to call on Congress to provide FERC with exclusive jurisdiction to site new transmission for a renewable project. Please comment.

Answer. Please see my answer to Senator Bingaman's question # 1. We believe the Energy Policy Act provides sufficient authority to DOE and to FERC. Within this authority we would encourage DOE to take a broader consideration of what it considers to be congestion. This could contribute significantly to the WREZ initiative and other transmission expansions in the west.

Question 6. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. No, we do not think it would be advisable to mandate a transmission line to carry only renewable resources. We are currently engaged in a transmission project development where a significant portion of the line capacity could be allocated to parties wanting to ship renewable power to markets. To the extent this includes intermittent resources such as wind generation, there will be excess transmission capacity that would be made available to the market place on an open access basis. It is possible that in conjunction with the development of wind generation in Wyoming, that back-up gas-fired generation would develop to produce a more firm and reliable product. It is also possible that this wind generation would be backed up by existing gas-fired generation already owned by the load serving entities that are buying the wind power.

RESPONSES OF GARY HANSON TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. You propose that the electricity system should be planned and built for regional markets. What is the appropriate regulatory framework to make decisions about a regional grid? Should it be federal, or can there be some kind of regional authority composed of state regulators?

Answer. It could be either. I simply have a bias against what I believe would be a terribly complex and potentially cumbersome 'one size fits all' federal bureau. Additionally, regional disagreements are usually easier to work out than national, especially with the integration of interstate transmission. However, federal laws would be necessary to create the authorities for regionalization and the FERC would be the most likely entity to oversee the regional authorities. One of the challenges needed to be overcome is the patchwork of state siting laws and authorities that create impediments to interstate transmission projects. Except perhaps for the natural division between the eastern and western grid, it is difficult to draw lines that separate regions when addressing electricity flows other than RTOs. I imagine the current map of RTOs/ISOs representing individual regional footprints. However, none of these footprints can operate independently and seams issues still need to be continually resolved.

Further, while there can be regional authorities, there will be disputes such as siting and cost allocation issues of major transmission lines between regions, and among states. There will be policy issues with broad effects that will affect all regional entities and those policy issues along with some of the disputes will have to be resolved at the federal level.

The MISO region is large in terms of both area and affected states and provinces. MISO is governed by a board and through stakeholders comprised of groups representing, among others, service providers, vendors, energy users, environmental groups and regulatory personnel. The affected states have joined to form an oversight group, but this group must petition the FERC if it disagrees with MISO policy.

MISO is primarily concerned with operating the transmission system, including consideration of system expansion for both reliability and economic purposes.

This framework could, and most likely should be used to accomplish Congressional policy directives as we move toward expanding the role of renewable energy sources. Still, that doesn't mean the regional entity would have pervasive authority. There will be issues, as stated above, that will require the FERC or DOE or possibly another federal agency's decision-making in order to accomplish both regional and national goals. I envision this process looking much like, or being added to the functions performed by an RTO with Federal oversight.

Question 2. I think that your proposal that WAPA join the Midwest ISO is an interesting one. Do you know why that has not happened? Is there some problem in federal law that prevents it?

Answer. We know that both cost and operational barriers exist for wind generation developers in WAPA's footprint who wish to sell into the MISO market. No doubt WAPA could outline benefits it would achieve with MISO membership. The reason this has not happened is very simple: it is the negative cost/benefit accruing to WAPA and its existing customers if it joins MISO.

WAPA serves a number of regions, including one which is primarily North and South Dakota. Costs incurred in this region must be paid by those in the region who use WAPA services. MISO membership also comes with a cost. If WAPA joined MISO to support wind generation it would unquestionably benefit wind generators. However, the costs of WAPA membership in MISO under the present rate structure would have to be paid by ND and SD WAPA customers. And the cost of membership is much too high to be diluted by the potential new wind generators. The existing customers would receive a benefit which is much less than the additional cost of MISO membership. There is a fundamental problem when the beneficiaries will be entrepreneurs and customers in markets outside the ND/SD region, yet the bulk of the cost will fall upon those who will likely benefit least. This is a challenge caused by license plate pricing and pancaking of rates.

I am not aware of Federal laws preventing WAPA from joining MISO.

RESPONSES OF GARY HANSON TO QUESTIONS FROM SENATOR DOMENICI

Question 1. Mr. Pickens suggests that Congressional siting provisions in EPAct—namely the NIETC process—did not go far enough. He suggests that we give FERC exclusive siting authority over renewable projects. As a state regulator, what do you think of this suggestion?

Answer. States have local knowledge that would benefit any transmission siting decision and that knowledge should be used. That considered, there is no doubt siting and construction of interstate lines face huge, if not insurmountable and time consuming barriers as attempts are made to traverse multiple states. In some cases intrastate lines may face huge barriers as well.

It seems fairly certain that state-by-state siting authority will not yield any near-term results for rapid expansion of the transmission system. Federal authority with state assistance appears to be a must if we are to move forward in developing a robust interstate grid for renewable energy. I also refer you to the answers to Senator Bingaman's questions.

Question 2. I understand that South Dakota is having some problems getting a transmission line through Minnesota for a clean coal project. Please elaborate.

Answer. Otter Tail Power Company is the lead partner in a proposed project to construct a base load generation plant to burn coal in a supercritical boiler to produce electricity. This plant, Big Stone II, is to be located adjacent to Big Stone I, both in South Dakota. The site is within a few miles of the Minnesota border, and would need either new or increased capacity of existing power lines to transport the power to a load or to where it enters the regional grid. BS II agreed to provide 850 MW of excess capacity on the transmission system for renewable energy. The endpoints of Otter Tail's transmission line construction are in Minnesota. Although, the plant received approval after the proper hearing process from the South Dakota PUC in 2006, the Minnesota commission has yet to approve the construction of the transmission line. Additionally, this is not a lengthy transmission line.

The Minnesota commission's process, which has initial hearings before administrative law judges, has essentially re-reviewed our proceedings twice. The first time the ALJ recommend approval. But after delays caused costs to rise, the Big Stone II partnership make-up changed and the plant was to be slightly smaller in capacity. Minnesota used this change to review it again and the second time the ALJ's recommended denial of the transmission line based on a second review of the plant. The final decision of the commission is now on hold as the commissioners could not reach a decision and one commissioner decided additional information was necessary.

Question 3. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. Exactly, because of the capacity factor issue one should not mandate renewable-only transmission. Also, the interwoven nature of the grid and physics of electricity operate in such a way that efficiency may be improved by allowing flows based on operating circumstances and not by generation source.

The lowest per unit cost of transmission is achieved when the line is used to capacity twenty-four hours a day. This is a 100% capacity factor, and as one shrinks usage and lowers the capacity factor the throughput is lowered and average cost per unit will be higher. Wind generally achieves capacity factors well below 50% and any facility dedicated solely to wind will come with a high transmission cost component. With the cost of new energy capacity continually increasing, it would be unwise to inflate those costs even further by specifying renewable-only transmission.

Question 4. The intermittent nature of renewable resources like wind present some challenges. How far off are future technological advances, such as electricity storage and better wind forecasting, which could help address some of these challenges?

Answer. Efficient and economical energy storage is an exciting issue and could change the industry in terms of generation and delivery, and would affect not only the traditional electricity markets, but the transportation industry as well. Although significant technological advances have been achieved, I know of no immediate or even near-term resolution for economical storage.

Better wind forecasting, development of areas with better wind regimes, and development of wind farms over larger areas aid greatly in resolving reliability and grid integration issues. Nonetheless, wind is intermittent and nondispatchable and will always need base load generation or dependable and economical storage.

RESPONSES OF T. BOONE PICKENS TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. You state that renewable projects need the production tax credit for long enough to get everything put into place to get a project going. How long do you think the tax credit should be extended?

Answer. Based upon my experience, if you want to encourage large scale projects like the Pampa project, the production tax credit needs to be in place for at least eight years in order for a developer to plan and complete development of a multi-gigawatt scale project. The extension of the production tax credit needs to be long enough to permit prudent people to plan and commit capital.

The production tax credit does not just affect wind project developers, it also affects decisions by equipment suppliers to commit the capital to open additional manufacturing facilities, and the decision by makers of component parts to commit to manufacture component parts for wind turbines in the United States rather than forcing turbine manufacturers to buy parts from existing European and Asian suppliers. Bringing these facilities to the United States requires that businesses feel good about investing in manufacturing facilities, and in hiring and training skilled workers. These investments need a multi-year extension to justify investing the capital. They cannot invest tens of millions of dollars to plants and people that may not be needed in two years.

Question 2. Do you think that a federal renewable electricity portfolio standard is a good idea?

Answer. I do believe that a federal renewable electricity portfolio standard is a good idea. As I have previously indicated, the federal government should view the energy crisis as a national priority that affects our national security, and do everything possible to encourage the development of renewable electricity generation as an alternative to oil importation. As of May 8, 2008, there were 30 states with some form of renewable portfolio standards according to the Department of Energy website, including three states with voluntary standards. At some point, it becomes important to have consistent national standards and deep, liquid markets for renewable energy credits. A federal standard would permit renewable projects to be located where they are most efficient and provide the greatest economic benefit to the country while the renewable electricity that they produce would benefit the entire country.

RESPONSES OF T. BOONE PICKENS TO QUESTIONS FROM SENATOR DOMENICI

Question 1. Under your proposed plan, natural gas would replace oil as a transportation fuel, thus leading to a 38% decline in foreign oil imports. Renewables, in

turn, would replace natural gas as an electricity source. As you know, currently approximately 3% of our electricity is provided by renewable resources. How much of an increase in renewable energy production would be "meaningful" for purposes for your plan?

Answer. I believe that the United States can reasonably achieve a goal of generating at least 22% of its electricity from wind and other renewables as the Department of Energy has outlined in the study that it released in April. The increase from 3% to 22% understates the amount of additional renewable generation that would be required, because the total amount of electricity that will be required by the United States in the future will be greater than it is today. However, this also means that you are not talking about putting existing generation facilities out of business as much as you are talking about building to meet new demand.

I also want to make clear that I favor using all of our resources to reduce our dependency on foreign oil. My plan is not just about wind, or even renewables, it is about using all of our available domestic resources, including nuclear and clean coal, to save our country.

Question 2. Your wind project certainly doesn't follow the norm—there aren't many people who are able to undertake the construction of their own transmission line. Your parallel project, the planned water pipeline, along with your water district's eminent domain authority, puts you in the unique position to deal with siting and permitting issues. However, you still have to face the financing and cost recovery issues. How are you planning to proceed on those issues or will you self-finance the transmission line?

Answer. I have the ability to pay for the transmission line out of my out pocket. I have not yet decided whether to do so. It would be patently unfair to deny cost recovery to me just because I do have the ability to pay for the transmission line out of my own pocket. There are, however, trade offs that are required for cost recovery, and I have not yet decided how to balance those tradeoffs, and may not decide for some time. However, whatever my decision, unless you want the additional renewable energy suppliers to be limited to a few people in my position, cost recovery needs to be addressed at the national level so that other renewable developers can also succeed.

Question 3. Most of the hearing testimony emphasizes the benefits of a collaborative regional process to address the critical need for transmission infrastructure for a number of reasons, including reliability and the need to transmit alternative energy sources. However, you insist that these collaborative frameworks are—at several years—too lengthy and that the country simply can't wait that long. Is there any way to expedite or streamline these efforts?

Answer. I have proposed that Congress grant to the FERC primary, original jurisdiction for interstate transmission projects, and require that the FERC process should be subject to a limitation, say nine months, on the length of time involved. I believe that this is necessary given the urgent nature of the imported oil crisis.

I do believe that there are models for responsible collaborative processes that involve the various stakeholders in siting decisions, and that those processes can be included without engendering significant delays. The Texas Competitive Renewable Energy Zone process is a good model, but as the first of its kind, it has taken a while to figure out all of the steps required and work through them. The Western Governors Association has undertaken a similar program, the Western Renewable Energy Zone process, funded by the DOE, that is working on a shorter timeframe. California apparently has sponsored a program involving various stakeholders to reach consensus on siting for renewable projects and transmission, which I understand is expected to be completed within nine months.

DOE should be mandated to work with states and regions that are interested in cooperating to help them bring their stakeholders together and reach a consensus on their views on siting and permitting and put those views forward in the FERC proceeding. This would allow for a collaborative process, but still require that the timeframe that I have proposed be implemented.

Question 4. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. Let me first say that transmission lines are usually constructed to serve a particular project or group of projects, so a requirement that a transmission line be intended substantially to serve a renewable project will probably be sufficient. However, let me also say that there may be technical reasons to permit a modest amount of controllable generation on the transmission line for purposes of grid stability. In addition, it may improve the economics of the transmission line significantly, saving consumers money, if the transmission line is permitting to carry elec-

tricity generated from controllable generation sources when renewable energy is not available.

RESPONSES OF RICHARD HALVEY TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. It strikes me that the most difficult issues that we face in getting transmission built are those of siting and cost allocation. Both are complicated by the fact that long-distance transmission must be built through several states and so across several jurisdictional boundaries. How do you envision a multi-state approach to siting working, and what regulatory framework would be required to sustain it?

Answer. In 2002, the Western Governors developed the Transmission Permitting Protocol. By June 2004, the governors of 12 Western states (AK, AZ, CA, CO, ID, MT, NV, NM, OR, UT, WA, WY), four federal agencies (Departments of Energy, Interior, and Agriculture and the Council on Environmental Quality), and the Premier of Alberta had signed the Transmission Permitting Protocol. The Protocol provides for coordination of permitting agencies for proposed interstate transmission projects; however, to date, there have been no new proposed interstate transmission lines that would trigger the protocol. Similarly, Section 1221(h) of the Energy Policy Act of 2005 requires coordination of federal agency permitting activities, and an interagency MOU has been executed to implement this section. Unfortunately, it is unclear how these two agreements will interact. We agree with Senator Bingaman that securing federal permits for interstate transmission remains the most difficult hurdle for transmission developers in the West. In any case, the Western Governors are reaffirming their commitment to the 2002 Protocol and would use the Protocol to approach multi-state siting.

Interstate allocation of the cost of new transmission has been held to be the ultimate obstacle to the construction of major transmission. It is important to note that the existing transmission backbone in the Western Interconnection was constructed through voluntary agreements among multiple companies. The cost of these projects was passed through to consumers. However, there is reason to believe that the future will not look much like the past. That is, when multiple load-serving entities determine they want to access the power at the other end of a major proposed transmission line they will successfully allocate the cost of the line among themselves and state regulators will find such an allocation prudent. The continued success of interstate cost allocation may, of course, depend on FERC policy allowing those who pay for transmission to use the transmission.

Question 2. Your zones are described as areas that contain the resources. The purpose of cost allocation—who bears what share of the cost—it would seeming that the zones need to include the load centers since it is the customers who are buying the electricity who ultimately will pay for the transmission. How do you see resolution of this problem working?

Answer. The current first phase of the WREZ project is critical. The WREZ will identify those areas that have a specific, significant amount of renewable energy potential, are developable given potential obstacles related to wildlife, lands, and natural resources, and have favorable development cost characteristics. In other words, the WREZ will make obvious the most favorable renewable energy development areas. This will in turn enable individual load serving entities (LSE) to more easily evaluate which zones make economic sense to them. Where multiple LSEs have interest in a zone, they may provide the critical mass for development of a transmission project to move generation from that zone to the LSEs. As part of the WREZ project, a transmission model is also being developed to enable LSEs, regulators and others to evaluate which zones might individually be the most attractive. The WREZ project will also allow LSEs to evaluate more distant renewable resources areas. We believe the LSEs understand the needs in their services areas. What they may not understand is the optimal potential for meeting those needs with renewable energy. This project will provide broad geographic information that will assist the LSEs in increasing the renewable energy portion of their portfolios.

RESPONSES OF RICHARD HALVEY TO QUESTIONS FROM SENATOR DOMENICI

Question 1. In your ongoing WREZ process with the Energy Department and other stakeholders, how are you addressing some renewable resources, such as water power, that will not fit neatly into these zones?

Answer. At this point, it is the intent of the WREZ project to at least identify renewable resources both within and outside a renewable energy zone. However, additional analytical work such as development of cost curves and examination of wildlife, lands and natural resources characteristics will be limited to the renewable en-

ergy zones. The major thrust of the WREZ is to identify those geographic areas with enough resource and other favorable characteristics to justify major transmission investments. Small resource areas, such as a single small hydro project typically do not require major transmission investments. However, as part of the identification of renewable energy potential, we intend to develop a roadmap that will outline how smaller resource areas can be integrated into resource portfolios.

Question 2. Most of the hearing testimony emphasizes the benefits of a collaborative regional process to address the critical need for transmission infrastructure for a number of reasons, including reliability and the need to transmit alternative energy sources. Mr. Pickens, however, insists that these collaborative frameworks are—at several years—too lengthy and that the country simply can't wait that long.

Do you agree with Mr. Pickens? Is there any way to expedite or streamline these efforts?

Answer. The WREZ project is working on an expedited timeline and we expect to have the identification of zones completed by early 2009. And given that the WREZ project is really a first of its kind with respect to its regional approach, it is premature to conclude that it will not provide the stimulus for more rapid renewable energy and transmission expansion. Secondly, given the potential opposition to certain renewable and transmission projects, the WREZ is likely to create greater certainty and minimal opposition regarding the developability of a number of areas. This in itself should reduce the overall timelines for project development. While Mr. Pickens' suggestion of mega-developers with access to virtually unlimited capital is one model, it is not the norm, nor can we rely on it. Finally, if there is an implication that federal pre-emption of state siting processes will expedite development, the pre-emption process established in Section 1221 of EPAct has often triggered litigation. In the West, the record shows that it is the federal agencies that are typically the major cause of delay in permitting transmission lines. We believe that if the federal government streamlines and coordinates its permitting process before pre-empting state siting processes, it will result in expedited development.

Question 3. With the National Interest Electric Transmission Corridor process established in EPAct 2005, Congress sought to address the critical issue of transmission siting. However, at this time, these provisions haven't been fully implemented and no line as been sited pursuant to EPAct. Nevertheless, the NIETC process has been contentious.

I was surprised then to read some testimony—including that from Mr. Pickens and Mr. Freeman with the WIA—that suggested these Energy Policy Act authorities did not go far enough. Mr. Pickens goes so far as to call on Congress to provide FERC with exclusive jurisdiction to site new transmission for a renewable project. Please comment.

Answer. As you state, there is no track record that Section 1221 pre-emption works. To the contrary, to date this process has resulted in excessive litigation. We believe that if the federal government is to pre-empt state siting decisions it should only do so based on clear, convincing information. For example, in the case of the Department of Energy's designation of a Southwest National Interest Electric Transmission Corridor, designation was based on anecdotal information and appears to be an arbitrary use of federal power. For that reason, any future federal NIETC designations must be based on robust information justifying the designation. Additionally, the pre-emption authorities in Section 1221 only apply to the condemnation of private lands. The major challenge in the West is securing permits to cross federal lands.

Question 4. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. It is the policy of the Western Governors that transmission be available for whatever energy sources require it. Mandates that transmission carry only renewable power are not needed and may, in some circumstances, hinder development of renewable resources. For example, coupling flexible dispatch non-renewable generation with variable output renewable generation may improve the economics of a major transmission proposal by reducing generation integration costs and increasing line utilization resulting in higher prices for the renewable generation and lower transmission rates. The WREZ is intended to complement all the efforts related to implementing WGA policy, including development of a mix of clean and diverse energy resources and having a secure, reliable interstate transmission network that can move all generated electricity to markets.

RESPONSES OF WILLIAM KAUL TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. You say that you had to get legislation passed to facilitate the process to ensure cost recovering and permitting. Was that just in Minnesota or were there elements in the laws of other states that had to be changed? Is there something that we should do at the federal level in legislation?

Answer. The legislative changes in Minnesota included addressing the issues of regulatory lag in cost recovery for investor-owned utilities, giving regional reliability and the electricity market due consideration in the certificate of need process, placing all transmission permitting within the purview of a single state agency and allowing for the transfer of transmission assets into a Transco if deemed in the public interest by the Minnesota Public Utilities Commission. Legislative changes sought and achieved in North Dakota and South Dakota addressed the regulatory lag issue only as other changes were deemed unnecessary. In our region, permitting and siting issues continue to take time (oftentimes 2 to 3 years) but the issues have not developed to the point that requires a federal role.

Having said that—viewing transmission expansion primarily from the point of view of enabling the development of renewable energy resources—there have been significant delays and controversy surrounding the certificate of need process in Minnesota for two transmission lines that provide an outlet for the proposed Big Stone II coal plant, located in South Dakota, just across from the Minnesota border. There are significant unresolved issues associated with that project, related to carbon emissions from the plant, even though it is not located in Minnesota. The Minnesota Public Utilities Commission has delayed making a decision on the transmission line certificate of need pending further development of the record around future risks and liabilities for ratepayers for carbon costs.

The CapX 2020 collaboration, as an open access, non-discriminatory common carrier, does not take any positions on the relative merits of various sources of generation, as required by the National Energy Policy Act of 1992.

As the market for renewable energy develops regionally, and the need for significant new, extra high voltage (EHV) transmission materializes, a much broader regional collaboration will be necessary and the collaboration needs to include key regulatory and legislative policy makers in addition to transmission utilities. Initiatives are underway attempting to meet the challenges.

For example, the Midwest ISO (MISO) has begun a process of developing a transmission grid expansion plan and a new transmission tariff for renewable energy development within a 13 state region. The first phase of the plan is to be completed in June 2009. Also, the Midwestern Governors Association (MGA) has a working group addressing the challenges of expanding the transmission grid for the purpose of developing renewable energy in its broad Midwestern region. The challenges are significant and if the MISO and the MGA are unable to meet them, a strong argument for federal legislation and/or regulation, multi-state siting and/or cost recovery could evolve. While time is of the essence—since the planning horizon for a large scale, inter-regional EHVgrid expansion is many years—the need for federal role in this region is not immediate. The CapX 2020 planning horizon is now in the 2016-2025 timeframe and these are the very issues we face.

Question 2. Does the Midwest ISO cost allocation formula on file at FERC, that is 80% participant funding/20% rolled-in cost, facilitate the construction of new transmission for renewables?

Answer. Inadvertently. While it never was intended to, the MISO "reliability" 80/20 tariff will provide a substantial ancillary benefit for wind development with the initial group of CapX 2020 projects. Actually, MISO has three tariff formulas in place that apply to projects depending on how they are classified, either as reliability, generation interconnection or economic. The 80/20 tariff formula is for projects that fit into the reliability category. Different cost allocation formulas apply for projects classified as generation interconnection or economic. In the reliability category, 80% is paid by customers in the geographic area whose service reliability is directly affected by the project. The 20% portion is rolled-in or "postage stamp" MISO-wide. The rolled-in portion (the 20%) of the tariff only applies to projects 345 kV or greater. CapX 2020 has two projects that were designed to address system reliability issues and likely will be classified as such, but that will also provide significant additional transfer capability to the system.

The MISO generator interconnection tariff is the tariff directly relevant to wind generators. However, this tariff was developed prior to the time when the transmission service request queues started filling up with wind projects. It was designed more for the gas turbine projects of the day and worked well for that purpose. It calls for the generation developer to pay for 50% of the network upgrades necessary for reliable operation of the system caused by the generator's project. The other 50%

is paid by local customers who derive a reliability benefit from the network upgrades. It's widely acknowledged that the generator interconnection tariff does not work well for wind projects. That is because the transmission developer must be able to identify the wind project developers at the time the transmission project is proposed. Since major transmission projects have a 5 to 7 year or longer lead time and wind projects have just a 2 year or shorter lead time, it is impossible to line up the developer's 50% commitment when the transmission project is proposed. Wind project developers cannot negotiate power purchase agreements (PPAs) that far in advance.

The California ISO has come up with, and the FERC has approved, an innovative financing approach that has the transmission owner pay all capital costs up front. Until the transmission investment later is recouped from wind generators as they interconnect to the transmission line, the transmission owner begins recovering the investment from its retail customers. Other regions, including ours, are looking at this approach to the extent it can be applied to certain types of transmission lines.

In our view, cost allocation procedures should take an inclusive, long-term view of project benefits and allocate costs over an appropriate size region. The mechanism(s) should be understandable and predictable without unreasonable analysis requirements and administrative burden. As mentioned above, MISO is working with stakeholders to propose a tariff that will facilitate the development of renewable resources in this region.

Once again I will refer you to the White Paper on principles of cost allocation and recovery commissioned by the WIRES organization, included with my testimony.

RESPONSES OF WILLIAM KAUL TO QUESTIONS FROM SENATOR DOMENICI

Question 1. You testified that CAPX is a "joint ownership" initiative that involves investor-owned, municipal and cooperative utilities in the planning, financing and ownership of transmission upgrades. What are the benefits of the "joint ownership" model and why did you proceed in this manner?

Answer. The Upper Midwest is populated with numerous non-profit cooperative and municipal utilities, as well as investor-owned utilities. These business models each have their advantages. For the non-profits, the advantages are low cost capital that can be leveraged for consumer benefit and self-regulation. Investor-owned utilities provide good investment opportunities in a highly capital intensive business that needs to attract capital. Joint ownership provides each business model an opportunity to achieve its goals. It also presents an opportunity to coordinate and gain consumer, landowner and political support for large-scale transmission projects. The CapX 2020 joint ownership model further provides efficiencies in planning, constructing and operating facilities, reducing the need for redundant functions and facilities in our overlapping geographies.

Question 2. Are there other successful examples of "joint ownership" of transmission in the U.S?

Answer. Joint ownership is not new—this model was used during the last major infrastructure build-out in the 1970's for new generation and transmission. Many power plants are jointly owned by multiple parties that include public power, cooperatives and investor owned utilities. One of the oldest transmission joint ownership arrangements is the integrated system in Georgia, which is jointly owned by Georgia Power, Georgia Transmission Company (a cooperative) and the Municipal Electric Authority of Georgia. Some other examples include: the American Transmission Company (Wisconsin Public Power Inc. owns 5.7% of the company); and Cinergy, Wabash Valley Power Association, and Indiana Municipal Power Agency which own a Joint Transmission System covering two-thirds of Indiana, part of Ohio and a small part of Kentucky.

Areas where joint ownership exists as the transmission development model have more robust integrated planning and development. This, generally, results in fewer transmission reliability and capacity deficiencies than occur in areas without joint ownership. We believe that joint ownership could facilitate financing and construction of transmission in every part of the country, given sufficient support from Congress and the FERC.

Question 3. The State of Minnesota has a very aggressive state RPS requirement—30% by 2020 for Xcel Energy and 25% by 2025 for other utilities. Is Minnesota on target to meet these RPS requirements?

Answer. Minnesota utilities are on track to meet these requirements. One of the concerns at the time the bill was drafted was whether transmission system limitations would prevent achieving the RPS. To address that concern, the legislation also required a transmission study that would identify new transmission facilities necessary to meet milestones in 2010, 2012, 2016, 2020 and 2025. That study was com-

pleted in November 2007. The result indicated that the CapX 2020 utilities had in place, proposed or were planning new projects to achieve the milestones through 2016.

As indicated in my testimony, meeting milestones beyond 2016 requires the integration of Minnesota RPS requirements with those of a larger market—going from 6000 MW to 15,000 MW or more; thus, efforts were launched by MISO, the MGA and CapX 2020 to look at broader regional planning. However, there are significant issues associated with transmission cost allocation if we are to build transmission beyond the needs of the Minnesota RPS. The current MISO tariff options do not meet the market needs for transmission development on this much broader scale, primarily for renewable energy development.

Question 4. In general, is it advisable to mandate a transmission line to carry only renewable resources?

Answer. No. Laws of physics and concerns about reliability and economics militate against such a mandate. Additionally, the Energy Policy Act of 1992 prohibits discriminatory use of the transmission system and therefore requires all generation resources equal access and use of the transmission grid. A national policy on carbon and/or renewable energy portfolio standards would be a more effective approach if the Congress wants to accelerate renewable energy development.

Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Yes. Intermittent resources such as wind need not only back-up power but other ancillary services as well. These other ancillary services include such things as load following, frequency response and voltage support. The transmission system needs to be designed to integrate all sources of generation, in addition to intermittent resources, into the entire system and managed as a whole, to be efficient and maintain reliability. While it may be possible to use the transmission that was constructed for the wind to also provide the back-up power and ancillary services for the wind, siting the needed back-up generation to use the transmission for wind capacity may not be the best location for system reliability or economics. To achieve a high level of penetration of intermittent renewable resources in an area, such as wind, that area must be able to interact with other areas to maintain the required real-time load-generation balance. That interaction requires sufficient transmission capacity between the areas, and this consideration alone will require expanding the system.

Siting any generation is very fact specific and depends on the generation technology to be used. Transmission plays an important role in generation siting but there are many other factors such as fuel source, water source, labor availability and the ability of technology to maintain reliability to name a few.

Question 5. The intermittent nature of renewable resources like wind present some challenges. How far off are future technological advances, such as electricity storage and better wind forecasting, which could help address some of these challenges?

Answer. As the amount of wind generation increases, the challenges of providing load-following, frequency response and voltage support will increase. There will be a real limit on how much intermittent energy can be accommodated by the electric grid, both in physical and economic terms. Industry experience to date, at lower levels of penetration of wind generation, has been mostly positive, especially in an organized market such as exists in MISO. However, there was a recent experience of system instability in Texas in which wind generation was a contributing factor. As penetration of intermittent resources increases, utilities will gain experience in managing the challenges, but we must be cautious. So far, storage remains in a research mode and not yet commercially viable. Integrating weather forecasts into operations will help some. Geographic scope and diversity of the intermittent resources will help smooth the variability, but a much more robust transmission system will be required to realize that benefit.

Question 6. With the National Interest Electric Transmission Corridor process established in EPAct 2005, Congress sought to address the critical issue of transmission siting. However, at this time, these provisions haven't been fully implemented and no line as been sited pursuant to EPAct. Nevertheless, the NIETC process has been contentious.

I was surprised then to read some testimony—including that from Mr. Pickens and Mr. Freeman with the WIA—that suggested these Energy Policy Act authorities did not go far enough. Mr. Pickens goes so far as to call on Congress to provide FERC with exclusive jurisdiction to site new transmission for a renewable project. Please comment.

Answer. In the Upper Midwest where some state level RPS mandates exist, transmission developments are moving along without a lot of regulatory impediments. As stated in my testimony, moving beyond a single jurisdiction or into a broader region without relatively consistent policy alignment and interest in renewable energy development, difficulties in permitting and determining cost allocation can be expected. These challenges increase the risks of transmission and wind developments and add delays and costs to an already long and expensive process. In the event that regional collaborations, such as that being undertaken by the MGA and the MISO are not successful, then a federal authority may be necessary in some cases.

Once again, thank you for the opportunity to appear before the Committee.

RESPONSES OF DONALD N. FURMAN TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Could you expand on the thought that larger control areas reduce the effect of the intermittency of wind generation? What ownership and management structures seems to provide this kind of benefit? In other words, are there parts of the country where things are managed better than in others, and if so, where?

Answer. There is strong evidence that larger control areas (also known as balancing areas) facilitate the integration of wind energy. The electric output from wind turbines over a broader area is less variable than the output from turbines clustered in a smaller area. In addition, larger balancing areas tend to facilitate access to a greater number of flexible generation facilities that can help integrate wind energy.

Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) typically offer larger balancing areas. 74% of wind development in the U.S. has occurred within RTOs and ISOs, even though these areas comprise only 44% of the nation's wind resources and 53% of electricity demand.

A recent study required by the Minnesota legislature to assess the reliability and cost of providing 20% of the state's electricity from wind stated: "The MISO [Midwest Independent System Operator] energy market also played a large role in reducing wind generation integration costs. Since all generating resources over the market footprint are committed and dispatched in an optimal fashion, the size of the effective system into which the wind generation for the study is integrated grows to almost 1,2000 individual generating units. The aggregate flexibility of the units on line during any hour is adequate for compensating most of the changes in wind generation."

Question 2. What kind of regulatory framework do you see as necessary for the resolution of multi-state cost allocation issues or siting problems?

Answer. High-voltage transmission facilities benefit everyone by promoting electric reliability and providing consumers access to a greater number of electric generation facilities. In addition, these transmission facilities are critical if the nation is going to be able to tap the full potential of our vast renewable energy resources.

Transmission cost allocation is probably the most challenging barrier to transmission development. The problem is that we have been allocating costs for a public good (transmission) on a voluntary basis. Some utilities their regulators would prefer to be free-riders, which leads to under-investment in transmission.

FERC should be given more authority and guidance to spread transmission costs broadly across all users and over time. This approach has been used in Texas and the UK, with positive results. In the context of interstate transmission facilities, FERC is best positioned to advance the public good through broad cost allocation.

FERC should also be given more authority to issue permits to construct transmission facilities if states are unwilling or unable to site the lines. FERC's current siting authority should be expanded to include transmission lines that are needed to access and deliver significant amounts of renewable energy.

RESPONSES OF DONALD N. FURMAN TO QUESTIONS FROM SENATOR DOMENICI

Question 1. It is my understanding that the capacity, or availability, of wind resources in the U.S. is between 10 and 15%. Is this correct?

Answer. The electrical output of a wind turbine depends on the wind speed. For the period 2004-2006, the typical wind plant in the U.S. operated at an average of 33-35% of its nameplate capacity, which is known as the plant's capacity factor, a figure that discounts output to account for time periods when the turbine is not producing or is producing below its maximum output. While an average capacity factor of 33-35% may sound low, this compares quite favorably to the capacity factors of many other types of power plants. Historical data from MISO indicates an average capacity factor of 8% for natural gas combustion turbine power plants, 11% for natural gas combined cycle plants, 3% for oil fired power plants, 27% for hydroelectric

plants, 66% for coal power plants, and 75% for nuclear power plants. In addition, wind plant capacity factors continue to increase due to advances in turbine technology and wind plant design.

Question 2. Since wind is an intermittent resource, must a buyer arrange for back-up power to meet load when the wind does not blow?

Answer. Grid operators are accustomed to accommodating a large amount of variability in the supply and demand of electricity. Demand for electricity changes constantly. Similarly, electricity supply can vary significantly if a power plant experiences failure and must disconnect from the grid in a fraction of a second, as all power plants do on occasion.

To accommodate this variability, system operators maintain a significant amount of reserve generation that can be called-up on short notice. Grid operators pool reserves for the whole system to allow them to respond to a variety of potential changes in electricity supply and demand. These same reserves are what grid operators use to accommodate the variability of wind energy.

Adding a large amount of wind energy to the grid can add some variability to the power system and thus cause an incremental increase in the need for reserves. However, a large number of studies have indicated that incremental reserve additions needed to accommodate wind energy are very modest, as are the costs of maintaining these reserves.

Question 3. Is the wind industry undertaking research and development to assist transmission providers with dealing with the intermittent nature of the resource?

Answer. Research and development efforts undertaken by members of the wind industry have produced technological advances hat have greatly enhanced the capability of wind plants to control voltage, frequency, and reactive power in ways that significantly improve the reliability of the power grid. As wind energy has become a mainstream source of electricity generation, industry leaders have devoted significant resources to ensuring that wind energy technology keeps pace with the demands of being a mainstream contributor to electric grid reliability.

The American Wind Energy Association (AWEA) has developed and distributed best practices for the reliable integration of wind energy with the electric grid. AWEA works with the Institute of Electrical and Electronics Engineers (IEEE), the Utility Wind Integration Group, the National Renewable Energy Laboratory, the Department of Energy, electric utilities, and international experts to disseminate the latest scientific findings related to the reliable integration of wind energy.

Question 4. In general, is it advisable to mandate a transmission line to carry only renewable resources? Given the capacity factor issues, shouldn't the construction of facilities needed to deliver wind also be available to deliver the back-up power and move other energy when the wind is not blowing?

Answer. For transmission lines that serve as part of the grid network, it is physically impossible to restrict the use of these lines to electricity from renewable resources. First, it is impossible to discern between electrons that are generated by renewable resources and electrons that are not. Even if this were not the case, the laws of physics dictate that electricity will flow along the path of least resistance from where it is generated to where it is consumed, making it very difficult to regulate the flow of electricity on the grid.

It is possible to ensure that new transmission lines will carry a significant amount of renewable energy by prioritizing construction of transmission lines in regions with significant renewable energy resources. Policies to promote the construction of transmission to renewable energy resource zones have been quite successful in Texas, Colorado, and California.

Question 5. The intermittent nature of renewable resources like wind present some challenges. How far off are future technological advances, such as electricity storage and better wind forecasting, which could help address some of these challenges?

Answer. Wind energy forecasting is already playing an important role in reducing the cost of integrating wind energy by reducing uncertainty about what wind output will be several hours or days in advance. Wind forecasting techniques are already quite advanced and are highly accurate, although incremental improvements in data collection and modeling techniques may yield further increases in accuracy. There is significant potential for better integrating wind forecasts into grid operations and better tailoring these forecasts to formats that are most useful to grid operations. For example, the New York ISO recently announced its implementation of a wind forecasting system that will allow operators to know in advance the level of wind output on its system.

Energy storage technologies deployed to serve the needs of the grid as a whole have the potential to modestly reduce the cost of integrating wind energy. Currently, increasing and decreasing the output of flexible generators has proven to be

a more cost effective means of accommodating variability on the electric grid than energy storage. It is important to emphasize that even if energy storage were to become more cost-effective, it would be inefficient to treat it as a resource dedicated to accommodating the variability of wind energy alone. It is much more efficient for flexible resources, such as energy storage, to serve as reserves for the grid as a whole instead of being dedicated to specific generators.

Question 6. With the National Interest Electric Transmission Corridor process established in EPAct 2005, Congress sought to address the critical issue of transmission siting. However, at this time, these provisions haven't been fully implemented and no line as been sited pursuant to EPAct. Nevertheless, the NIETC process has been contentious.

I was surprised then to read some testimony—including that from Mr. Pickens and Mr. Freeman with the WIA—that suggested these Energy Policy Act authorities did not go far enough. Mr. Pickens goes so far as to call on Congress to provide FERC with exclusive jurisdiction to site new transmission for a renewable project. Please comment.

Answer. The Energy Policy Act of 2005 authorized provided FERC with "backstop" authority to site transmission lines, under certain circumstances, if the proposed line would be located in a National Interest Electric Transmission Corridor (NIETC) as designated by the Department of Energy (DOE). FERC has no authority over a proposed transmission facility if the facility is not in a NIETC. To date, DOE has only designated two corridors. In addition, it is not entirely clear whether DOE believes it has the authority to designate corridors in areas that are not currently congested but where significant renewable resources are located. At the very least, the statute should be amended to permit DOE to designate areas with significant renewable energy potential as NIETCs.

It may also be appropriate for Congress to consider whether to grant FERC exclusive authority to site certain interstate transmission lines. As FERC Chairman Kelliher recently testified before the Senate Energy and Natural Resources Committee, FERC's current backstop authority does have some limits that could impair the construction of vitally necessary transmission facilities. I agree with Chairman Kelliher that Congress should consider giving FERC broader authority.

Question 7. I understand that it can be difficult to quantify the costs of wind power to the consumer. Please provide the committee with the cost per kilowatt hour of wind energy throughout the county on a region-by-region basis and, if possible, state-by-state basis.

Answer. The cost of wind will vary by region of the country, mostly related to the wind resource and capacity factor. The Midwest and Western regions of the country have some of the best wind resource and therefore may have a lower cost per kilowatt hour than other regions of the country. The range of capacity factors in 2007 by region are below, from DOE Annual Wind Power Market Report.

An improvement in capacity factor will lead to an equivalent improvement in cost. For example, a 10% increase in capacity factor (33% increasing to 36%) will lead to a 10% decrease in cost per kWh, holding all else equal.

For the recent DOE report, 2% Wind Energy by 2030, Black & Veatch developed cost estimates for wind, along with other technologies.[1] Without the PTC, the wind cost estimates range from 7.2 cents to 8.5 cents per kilowatt hour for class 4 through 6 wind resources, depending on capacity factor.

Finally, the cost of wind has increased significantly in recent years, primarily due to increased turbine costs which is a result of exchange rate penalty and declining value of the US dollar, increased steel prices and other raw commodities, and labor costs. The cost of all energy resources has increases similarly. The recent increase is documented in the DOE Annual Wind Power Market Report, see chart below.*

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[1] 20 Percent Wind Energy Penetration in the United States http://www.20percentwind.org/Black__Veatch__20__Percent__Report.pdf

* Graphics have been retained in committee files.