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HYDROPOWER: PROVIDING 75% OF AMERICA'S CURRENT RENEWABLE ENERGY. EXPLORING ITS ROLE AS A CONTINUED SOURCE OF CLEAN, RENEWABLE ENERGY FOR THE FUTURE.

OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON WATER AND POWER

OF THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

SECOND SESSION

Thursday, June 12, 2008

Serial No. 110-76

Printed for the use of the Committee on Natural Resources

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html
or
Committee address: http://resourcescommittee.house.gov

U.S. GOVERNMENT PRINTING OFFICE

43-121 PDF WASHINGTON : 2008

For sale by the Superintendent of Documents, U.S. Government Printing Office
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OVERSIGHT HEARING ON "HYDROPOWER: PROVIDING 75% OF AMERICA'S CURRENT RENEWABLE ENERGY. EXPLORING ITS ROLE AS A CONTINUED SOURCE OF CLEAN, RENEWABLE ENERGY FOR THE FUTURE."

Thursday, June 12, 2008

U.S. House of Representatives

Subcommittee on Water and Power

Committee on Natural Resources

Washington, D.C.

The Subcommittee met, pursuant to call, at 2:51 p.m., in Room 1324, Longworth House Office Building, Hon. Grace Napolitano [Chairwoman of the Subcommittee] presiding.

Present: Representatives Napolitano, Costa, Baca, McMorris Rodgers, and Smith.

Also Present: Representatives Sali, Hastings, Herger, and Shadegg.

Mrs. NAPOLITANO. Good afternoon, and welcome to the meeting of the Subcommittee on Water and Power, which will now come to order.

The purpose of today's meeting is to hold an oversight hearing at the request of Ranking Member Cathy McMorris Rodgers on "Hydropower: Providing 75 Percent of America's Current Renewable Energy. Exploring its Role as a Continued Source of Clean, Renewable Energy for the Future."

Welcome to all Congress Members and my friend and colleague, the Ranking Member of the Subcommittee, Cathy McMorris Rodgers, and to our guests.

And we are expecting some of our colleagues to join us, Congressman Bill Sali of Kuna, Idaho; and Congressman Doc Hastings of Pasco, Washington.

Welcome, Doc and Mr. Sali.

Congressman Wally Herger of Chico and Congressman John Shadegg of Arizona may also be joining us. And welcome.

And I will turn it over to my colleague for her to continue the hearing.

STATEMENT OF THE HON. CATHY McMORRIS RODGERS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mrs. MCMORRIS RODGERS. I ask unanimous consent that Congressman Sali, Congressman Hastings, Congressman Herger and Congressman Shadegg be allowed to sit on the dais and participate in the Subcommittee proceedings today.

Without objection, so ordered.

After my opening statement, I will recognize all the members of the Subcommittee for any statement they may have. Any member who desires to be heard will be heard.

Additional material may be submitted for the record by members, by witnesses or by any interested party. The record will be kept open for 10 business days following the hearing.

The 5-minute rule with our timer will be enforced. Green means go. Yellow is just like the stop light; it means hurry up and end. Red means stop.

I sincerely want to thank the Chairwoman of this Subcommittee, Grace Napolitano, for the opportunity to hold this hearing. It is quite unusual for a Chairwoman to recognize the request of a Ranking Member. And I like this, and I want to just applaud your willingness to listen and learn from some differing perspectives.

As you know, I requested this hearing because, as Congress examines the facts surrounding global warming, I believe we owe it to the American people to be honest and realistic about how we are going to meet our energy needs. Today's hearing is the first step toward giving the American people and those inside the Beltway much-needed information about hydropower, which, in many ways, is an environmental success story.

Hydroelectric dams across the West and especially in Washington State provide us with clean, affordable and renewable energy. In fact, dams provide nearly two-thirds of Washington State's electricity at a time when more than 50 percent of the country is dependent upon coal. According to the Northwest Power and Conservation Council, these dams have kept the Pacific Northwest carbon footprint at half that of the rest of the Nation.

I and many of my colleagues here today are here to showcase the low-cost energy promises that FDR, JFK and LBJ made to the West. The river systems throughout the Pacific Northwest are a critical part of our region's economy and should be used for transportation, irrigation and recreation. These dams built our economy and continue to contribute to our way of life.

According to NOAA Fisheries, salmon survival in the Columbia/Snake River is higher today than before the dams were built. It is estimated that 98 percent of adult fish and 90 percent of juvenile fish navigate the dams successfully.

Despite the success, there continues to be some that wage war on the dams, namely the removal of the four lower Snake River dams, which happen to be in my district and Doc's. We heard about this at a recent Fisheries Subcommittee hearing from our Seattle colleague, Jim McDermott.

Yet what was missing from that debate was the fact that the removal of the Snake River dams would add 5.4 million tons of CO2 to the atmosphere each year, and it would take three nuclear, six

coal-fired, or 14 gas-fired power plants to replace their electricity generation. These dams also serve as the base resource for integrating wind energy into the Northwest grid.

At a time of growing energy demand, it makes no sense to throw this clean energy source away. I am committed, as we move forward with the debate on global climate change, that hydropower be recognized for the important role it plays in our markets. If the Chicago Climate Exchange can accept hydro from Chelan County PUD as a carbon offset, Congress should be able to do the same.

I hope today's discussion is the start to a better understanding of the value hydropower has, and look forward to forming a bipartisan congressional caucus to protect and promote hydropower.

We are privileged to have before us today some of the best and brightest energy experts. I welcome our distinguished witnesses.

And thank you, once again, Madam Chairwoman, for having this hearing.

[The prepared statement of Mrs. McMorris Rodgers follows:]

Statement of The Honorable Cathy McMorris Rodgers
Ranking Member, Subcommittee on Water and Power

I sincerely thank you for extending this opportunity for holding this much-needed hearing, Madam Chairwoman. It's a real pleasure to work with you on this and other important matters.

As you know, I requested this hearing because as Congress examines the facts surrounding global warming we owe it to the American people to be honest and realistic about how we are going to meet our energy needs. Today's hearing is our first step towards giving the American people and those inside-the Beltway much-needed information about hydropower, which in many ways is an environmental success story.

Hydroelectric dams across the West and especially in Washington state provide us with clean, affordable, and renewable energy. In fact, dams provide nearly two-thirds of Washington state's electricity, at a time when more than 50% of the country is dependent upon coal. According to the Northwest Power and Conservation Council, these dams have kept the Pacific Northwest's "carbon footprint" at half that of the rest of the Nation.

According to The Wenatchee World, carbon-free hydropower is the "power source that much of the regional environmental community consistently maligns, or attacks by devious, litigious means." The editorial goes on to say that "we should learn to appreciate the fact that our regional impact on the atmosphere, and potentially on climate change, is significantly reduced because our economy is powered by falling water." I couldn't agree more.

I—and many of my colleagues here today—are here to showcase the low-cost energy promises that FDR, JFK and LBJ made to the West. The river systems throughout the Pacific Northwest are a critical part of our region's economy and should be used for transportation, irrigation and recreation. These dams built our economy and continue to contribute to our way of life.

According to NOAA Fisheries, salmon survival in the Columbia and Snake rivers is higher today than it was before the dams were built. It's estimated that 98% of adult fish and 90% of juvenile fish navigate the dams successfully.

Despite this success, there are still some that continue to wage war on dams, namely the removal of four lower Snake River dams. We heard about this at a recent Fisheries Subcommittee hearing from our Seattle colleague, Jim McDermott. Yet, what was missing from that debate was the fact that removal of the Snake River dams would add 5.4 million tons of C02 to the atmosphere each year and it would take three nuclear, six coal-fired, or 14 gas fired power plants to replace their electricity generation. The dams also serve as the base resource for integrating wind energy into the Northwest grid.

At a time of growing energy demand, it makes no sense to throw this clean energy source away. I am committed, as we move forward with the debate on global climate change, that hydropower be recognized for the important role it plays in our markets. If the Chicago Climate Exchange can accept hydro from Chelan County PUD as a carbon offset, Congress should be able to do the same.

I hope today's discussion is the start to better understanding the value of hydropower here in Congress and look forward to forming a bi-partisan Congressional Caucus to protect and promote hydropower.

We are privileged to have before us today some of the best and brightest energy experts before us today. I welcome our distinguished witnesses and thank you once again, Madame Chairwoman, for having this hearing.

STATEMENT OF THE HON. GRACE NAPOLITANO, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mrs. NAPOLITANO. You are very welcome, Mrs. McMorris Rodgers.

And I, too, have a great interest in hydropower. I am glad that my colleague had asked that we look at it.

We need to look at every single source of assistance to developing hydropower and how well some of the grids are doing and how we can connect newly developed power and how can we begin to look at how everybody is deeming whether hydropower is taxable or nontaxable—all the little intricacies that everybody is now facing—how do we help be able to make it more feasible to add to that, to serve the growing constituency of ours throughout the United States. It isn't just in Cathy's area or in mine, but throughout many areas of our country.

It is a very important issue, and I am glad that she raised it. I am happy to join forces to have a look-see and get more input, information so that possible legislation that will help address what is being faced currently and being able to ask the bureau and possibly the Army Corps to be partners along with us in addressing these issues.

And, with that, Mrs. McMorris Rodgers, thank you very much.

[The prepared statement of Mrs. Napolitano follows:]

Statement of The Honorable Grace F. Napolitano, Chairwoman, Subcommittee on Water and Power

Good morning. This meeting of the Subcommittee on Water and Power will come to order.

The purpose of today's meeting is to hold an Oversight Hearing on "Hydropower: Providing 75% of America's Current Renewable Energy. Exploring its role as a continued source of Clean, Renewable Energy for the Future."

We welcome all Congress Members, especially my friend and colleague Ranking Member of this Subcommittee, Congresswoman Cathy McMorris Rodgers. Welcome to guests to the Subcommittee today, we are expecting our colleagues Congressman Bill Sali of Kuna, ID, Congressman Doc Hastings of Pasco, WA, and Congressman Wally Herger of Chico, CA. Congressman John Shadegg of Arizona also might be able to join us. Welcome.

After my opening statement, I will recognize all other Members of the Subcommittee for any statement they may have. Any Member who desires to be heard will be heard. Additional material may be submitted for the record by Members, by witnesses, or by any interested party. The record will be kept open for 10 business days following the hearing. The five-minute rule with our timer will be enforced, green means go, yellow near end, and red means stop.

Today's hearing is at the request of Ranking Member McMorris Rodgers. This is a very important issue to her and her constituents. I am eager to learn more about the connection between water availability and hydropower capacity.

We look forward to hearing from all witnesses. Thank you all for being here today. I am pleased to now yield to my friend and colleague, Ranking Member Congresswoman Cathy McMorris Rodgers, for her statement.

Mrs. MCMORRIS RODGERS. We will start by recognizing Subcommittee members, and I will ask everyone to keep their statements as short as possible. They can be submitted for the record.

Mr. Smith from Nebraska?

STATEMENT OF THE HON. ADRIAN SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEBRASKA

Mr. SMITH. Thank you.

Well, just very briefly, I would like to point out that this hearing is very important. And certainly I am energized to—no pun intended—hear more about the potential for hydropower. I know that in Nebraska we have some smaller projects, but they are vital in their functioning, and certainly it is relevant to our issues today.

Thank you.

[The prepared statement of Mr. Smith follows:]

Statement of The Honorable Adrian Smith, a Representative in Congress from the State of Nebraska

Good afternoon and thank you, Chairwoman, for agreeing to hold this hearing today entitled, "Hydropower: Providing 75% of America's Current Renewable Energy. Exploring its role as a continued source of Clean, Renewable Energy for the Future."

I long have been an advocate of energy policy designed to boost domestic supplies of all sources of energy in an environmentally-safe, affordable, and reliable way. While energy is a topic on everyone's mind, I want to be sure hydropower is included and promoted as an energy source.

My home state of Nebraska has benefited from clean, inexpensive, renewable hydropower, and we have the potential to produce more. Demand for electricity continues to grow, giving all sources of energy, including hydropower, an increasingly important role for the future.

As we encourage more renewable energy production, hydropower offers a viable option for consumers. Not only is hydropower emissions-free, but it also serves as a more consistent means of regulating the flow of electricity for the power grid.

Furthermore, hydropower projects in my district also serve irrigation, flood control, and recreation activities. Agriculture is at the center of Nebraska's economy and many of my constituents rely on irrigating farmland. In addition, hydropower's reservoir system provides optimal habitat for many species of fish and wildlife. Because of our multi-purpose dams and reservoirs, more fishing, hunting, boating and other recreational opportunities are available for all Nebraskans to enjoy.

I appreciate the Subcommittee for holding this hearing on the importance of hydropower. As a Nebraskan and a member of this Subcommittee, I want to ensure our energy policy is properly prioritized. I look forward to learning more from all of our witnesses.

Chairwoman, I look forward to working with you on increasing the use of clean, renewable, affordable hydropower.

Thank you.

Mrs. MCMORRIS RODGERS. Thank you.

Mr. Baca?

STATEMENT OF THE HON. JOE BACA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. BACA. Well, thank you very much.

First of all, I want to thank the Chair, Grace Napolitano, and you, Mrs. McMorris Rodgers, for holding this hearing.

When we look not only at hydropower, but when you look at water and power and what it means to our country right now, it is an area that we need to address because not only how it impacts us now, but how our country will be faced in terms of the future.

So I am glad that we are going to be addressing a lot of these issues as we begin to look at how our cities will operate within each of our areas and how we can turn around and use not only water and power to meet our energy needs.

So, with that, thank you very much for having this hearing.

Mrs. MCMORRIS RODGERS. Thank you.

Mr. Sali?

STATEMENT OF THE HON. BILL SALI, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IDAHO

Mr. SALI. Thank you, Madam Chair.

A couple of things.

First of all, Idaho ranks number nine in the Nation for installed hydropower generation capacity, but it is first in net generation capacity. Eighty-four percent of the net generation in Idaho is provided by hydropower.

There are great benefits, including cost, at 4.92 cents per kilowatt hour compared to the national average of 8.9 cents per kilowatt hour. Everybody knows hydropower is clean, it is renewable, it is reliable, it is pollution-free.

Today the Brookings Institute has released an economic vitality report, and it ranks Boise, Idaho, better overall than any other metro area in the United States. The study was based on three key measures of economic vitality, which are productivity, social inclusion and environmental sustainability. The study found that the Boise-Nampa metro area ranked fifth nationally for the lowest per capita carbon footprint in the Nation. And it was reported that, in general, Western states fared better in the rankings—and I am quoting from the study—"primarily because the region relies on clean hydropower for most of its electricity."

The conclusion of this study is that other metro areas in the United States ought to try and emulate places like Boise, Idaho, and our reliance on hydropower and the electricity that comes from it, which keeps our carbon footprint very low.

You know, we will have a lot of discussion today about the millions of tons of carbon emissions that are saved by using hydropower in the United States. With that, Madam Chair, I will cut off my opening statement and submit it for the record.

[The prepared statement of Mr. Sali follows:]

Statement of The Honorable Bill Sali, a Representative in Congress from the State of Idaho

Madam Chairwoman,

At a time of increasing discussion about energy resources that are efficient as well as friendly to the environment, hydropower fits the bill to a "tee." Hydropower is clean, renewable, reliable, and pollution free, generating electricity using the pull of gravity on water as it flows down river.

The advantages of hydropower are numerous. For example, the cost of producing power is extremely low. Its power generation is flexible enough to respond quickly to energy demands. It's two times more efficient to produce than any other source. And it produces no greenhouse gasses.

I'm from the Northwest where hydropower accounts for more than 60 percent of the power generated there. The great State of Idaho ranks ninth in the nation for installed hydropower generation capacity, and first for net generation from hydropower. A full 84 percent of the net generation in Idaho is provided by hydropower.

The benefits of hydropower are directly reflected in the price of electricity. Idaho has the lowest average retail cost of power in the country, at 4.92 cents per kilowatt hour, compared to the national average of 8.90 cents.

Together with the overall reduction in carbon emissions, hydropower plays a key role in the quality of life we enjoy in Idaho. The Brookings Institution's economic vitality report being released today ranks Boise, Idaho better overall than any other metro area in the United States. The study was based on three key measure of economic vitality productivity, "social inclusion" and "environmental sustainability." The study found that the Boise-Nampa metro area ranked fifth nationally for the lowest per-capita "carbon footprint" in the nation. It was reported that in general, western states fared better in the rankings, "primarily because the region relies on clean hydropower for most of its electricity."

Last year alone, we avoided some 160 million tons of carbon emissions by the use of hydropower here in the United States. Without hydropower this electricity would be replaced by other energy sources, exponentially increasing carbon emissions, particularly in the Northwest.

And yet, there are those who want to remove some of the largest hydroelectric generators in the Northwest. Less than a month ago, we held a hearing that focused on breaching hydropower dams. That proposition has been studied over and over again at taxpayer expense, both under Democrat and Republican administrations, and the result has always been the same-it has never been recommended that the dams be removed.

The fact remains: there are significant environmental consequences if the dams are breached. And these are consequences of which my constituents will bear the brunt.

I am pleased to be sitting here today discussing the benefits of hydropower, and consider both our current capacity and the future of hydropower in this country.

Mrs. MCMORRIS RODGERS. Thank you.

Mr. Hastings?

STATEMENT OF THE HON. DOC HASTINGS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF WASHINGTON

Mr. HASTINGS. Thank you very much, Madam Chairman, and thank the Ranking Member for allowing me to sit on the dais with you. I had the opportunity to serve on this committee my first term in Congress, and things haven't changed much. I think the pictures have been moved around a little bit. But I do want to thank you very much for the opportunity to be here today.

And I would ask unanimous consent that my full statement appear in the record.

I would like to just acknowledge two people that are going to be on these panels from eastern Washington.

The first is Bob Morton, over on our far left. Bob is a leader in the Washington legislature. He is a State Senator on natural resource issues. And a lot of the things that he does and his staff do are looked at and consumed by a lot of people in the Northwest. So I want to acknowledge Bob Morton here.

And then on the second panel is Tim Culbertson. And Tim is the general manager of the Grant County Public Utility District. And they just recently—they have two non-Federal dams on the Columbia River, and they just recently got FERC relicensing on both of those dams. And Tim has been a leader in power issues within the Northwest.

I should also recognize Glenn English, who was a former—I wasn't here when Glenn was in the Congress, but he represented Oklahoma's 6th District for many years before becoming CEO of National Rural Electric Coop.

There has been a lot of discussion about hydropower. I just want to make a couple of facts, because those of us in the Northwest recognize how important hydropower is. But just a couple of facts.

Annual hydropower output is equivalent to energy produced by 200 million barrels of oil. Hydropower is clearly the most efficient form of electrical generation.

Hydro backs up other renewable energy sources, such as wind and solar. Just keep in mind, wind power doesn't work unless the wind is blowing, and solar power doesn't work unless the sun is shining. Hydro, of course, works because it is water going downhill, and it is a good back-up for these other energy sources.

And hydro offsets more carbon emissions than all other—all other—renewable energy sources combined. And we are a leader in the Northwest, as far as carbon emissions in the Northwest, and it is principally because of hydropower.

So as we are going to have this discussion about global warming and carbon offsets and all these sort of things, I think what we need to do is continually push hydropower, because it is very, very clean.

And I thank both of you for holding this hearing. I think it is a very, very important hearing that we can get from people that are in the field the benefits of hydropower.

So, with that, Madam Chairman, I yield back my time.

Mrs. MCMORRIS RODGERS. Thank you very much.

Mr. Herger?

STATEMENT OF THE HON. WALLY HERGER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. HERGER. Thank you very much, Madam Chairwoman and Ranking Member. I thank you for holding today's oversight hearing and for allowing me to participate.

There has been a tremendous amount of interest in the development of new technologies to help guide a clean energy future for our Nation. But as we develop the next generation of energy sources, we cannot overlook the importance of hydroelectricity, a time-tested, proven, renewable energy technology that is widely available today.

No other clean, renewable energy source provides the same combination of cost effectiveness, efficiency and dependability as our Nation's hydropower facilities. The premier hydroelectric facility in my home State of California, Shasta Dam, currently provides enough emissions-free electricity to serve up to 700,000 households. Clean energy from Shasta Dam has helped the city of Redding, the largest city in my northern California congressional district, develop an impressive renewable energy portfolio. Indeed, 25 percent of Redding's electricity comes from hydropower, making it one of the most renewable-friendly cities in our Nation.

Madam Chairwoman, the mayor of Redding has sent me this letter on the benefits of hydroelectricity. And, with your permission, I would like this letter to be made a part of today's hearing record.

Mrs. MCMORRIS RODGERS. So ordered.

Mr. HERGER. Thank you.

[NOTE: The letter submitted for the record by Mr. Herger has been retained in the Committee's official files.]

Shasta Dam is also incredibly efficient. Recent upgrades allow the turbines at Shasta to utilize up to 98 percent of the energy stored in each acre-foot of water that passes through the dam. Fossil fuels are critically important to our energy security, but no fossil energy plant can match that high level of efficiency.

Like other hydro facilities, Shasta Dam can also respond to the changing energy needs of its customers literally in a matter of seconds, something that simply can't be done at a thermal energy plant. In addition to its virtues as an energy source, Shasta Dam delivers other critically important benefits, such as water storage, flood control and recreation.

Madam Chairwoman, as Congress continues to look for ways to encourage clean and reliable energy to power our Nation, hydroelectricity must remain at the forefront of this discussion. In my view, rather than tearing down dams, we should be looking for opportunities to build more.

Thank you again for holding this hearing. I look forward to listening to today's witnesses.

Mrs. MCMORRIS RODGERS. Thank you.

Next, Mr. Costa?

STATEMENT OF THE HON. JIM COSTA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. COSTA. Thank you very much, Madam Chairwoman, for both of your efforts in holding this afternoon's hearing. It is important. Hydroelectric power does provide the majority of America's renewable energy supply. And, in California, it has been doing that for over 100 years.

We have one project called the Big Creek Project that provides water to southern California, and it used to be dubbed the "hardest working water in the world" and, in the 1930s, provided half the electrical supply for the city of Los Angeles. Now, Los Angeles has grown since the 1930s, so it doesn't provide quite as much of their total source of power, but nonetheless it is still an important increment of southern California's power, along with Shasta, as my colleague, Mr. Herger, noted, and other very important hydroelectric projects throughout the State as well as throughout the Nation.

In addition, we have also implemented, where the economics have worked, small hydro, where we have used just our canals to put small hydro systems on that maybe only can operate for an irrigation season of 2 months or 3 months based upon water availability. And they play a role, as well.

I guess what I am going to be looking for, in terms of the expert testimony this afternoon, is, with the changes occurring in climate—and it doesn't matter whether or not you subscribe to man's impact on the climate, I can tell you it is changing. It has been changing ever since the planet has been here. We have had ice ages. It is changing. Now, how much we are contributing is another debate, but it is changing.

And with the changes, with late winters, early springs, how do we operate these projects? In every hydroelectric project we have a certain capacity that is built in—whether it is Shasta or whether it is the Big Creek Project, or any others—for water supply, for municipal and irrigation use, for farms. We have a certain amount

that is for flood control, and we have a certain amount that is for electrical generation. And sometimes when it is optimum to generate power, we may need to keep that water there for our farms, or we may need to maintain the adequate reservoir supply for our city's use, not to mention being prepared every wintertime for a big flood that may occur based upon the amount of snowpack that you get.

So I am wondering what kind of work is being done to determine how we operate these projects in light of changing weather conditions.

So, with that said, I want to thank you all, and I look forward to the testimony.

Mrs. MCMORRIS RODGERS. Thank you.

Madam Chairwoman?

Mrs. NAPOLITANO. Thank you, Madam Chairwoman.

I would like to ask this committee for a moment of silence for former Commissioner Keys who perished in an airplane accident. He was a good public servant that we had the greatest respect for. So if I may, Madam Chair, I would like to ask for one moment of silence.

Mrs. MCMORRIS RODGERS. Yes.

Thank you. I might also mention to the committee members someone, I think it might have been the Chairwoman, made some cupcakes that you can find in the back when you need a little nourishment. And I can testify she is a good cook.

OK. Let's get to those that have traveled, some a long distance, to be here today. Our first panel, we have The Honorable Bob Morton, Washington State Senator from Kettle Falls, Washington. Next, Bob Johnson, Commissioner of the Bureau of Reclamation here in Washington, DC; Dr. Howard Gruenspecht, Deputy Administrator of the Energy Information Administration here in Washington, DC; Melinda Eden, Oregon Council Member from the Northwest Power and Conservation Council. She is from Milton-Freewater, Oregon. And, finally, The Honorable Glenn English, chief executive officer of the National Rural Electric Cooperative Association in Arlington, Virginia. Mr. English also served as a Member of Congress from Oklahoma's 6th Congressional District for 10 successive terms.

So welcome, everyone.

We will start with Senator Morton.

STATEMENT OF THE HON. BOB MORTON, SENATOR, STATE OF WASHINGTON, KETTLE FALLS, WASHINGTON

Mr. MORTON. Thank you, Acting Chairwoman McMorris Rodgers, and thank you, Madam Chairwoman of the committee, Chairwoman Napolitano.

Yes, I am Robert Morton. I serve in the legislature in the State of Washington in the Senate and on most of the natural resources, energy, environment and water committees. And I understand one of my tasks today is to bring a little background of the history of our area.

I share my district in bordering with both the acting Chairwoman and with Congressman Hastings. And together I have, with them on the one shoreline and me on the other, all of the waters

behind Grand Coulee, but many of the dams, both in the Snake River and the Pend Oreille River.

I might mention that the Pend Oreille supplies one-third of the water volume into the Columbia where they merge, and most people don't realize that. The heaviest flows come out of, of course, British Columbia, Alberta, and down into Idaho, Montana and then into Washington.

We have 55 major dams; 29 of those are projects of the Federal Government. And it is important to point out that the remaining non-Federal dams primarily come from the local PUDs, the public utility districts. The Bonneville Power Administration, the BPA, administers and distributes the power supply from these dams, a unique arrangement based in Portland, Oregon.

If you ever have the opportunity to be there, it is very educational. No Federal tax dollars are involved in this. It is paid for by the recipients, the ratepayers. And it provides us, as many of you had mentioned, with some of the cleanest power that we have.

Yes, the hydropower is sold in the summertime to those who need it. In the wintertime, we have to buy much of the water and/or the electricity that is supplied by the water. However, because of the statistics that are used, there has been some assumption that the hydropower in the Northwest is all tapped out. This simply is not true. The many undeveloped sites still remain where we can place dams, create the pools for the flow for generation of the power.

We also must recognize that many of the dams that are there are not storage dams. They are run of the river. And that makes a big difference in examining them—and one of the points I would make later—examining the potential of increasing the height of these dams and therefore capturing much of the snowpack that comes out of Canada for us.

Seventy-five percent of Northwest's energy transmission is also under the jurisdiction of BPA. So we must look not only at the dams and the storage and the generation; now we have the power generator, how do we transmit it? And we are in great need of improved enlarging of our transmission.

It is interesting to note, to give you a little comparison, the Columbia basin area alone, which is primarily what we refer to as the Columbia basin of the Columbia River, is 260,000 square miles. And that is an area that is equal to the Nation of France, just to put it in perspective.

In distributing this power, it is also the responsibility, then, of BPA. The Bonneville Power Administration then offers it first, by Federal law, offers it first to the local areas, regions. And if they do not need it, then they can go ahead and sell it.

As I mentioned, we have, however, the ability to both sell or export and import—export during the summer months, and then we need to import during the winter months. It is a reliable, affordable and renewable, with no greenhouse gases emitted.

Mrs. MCMORRIS RODGERS. Senator Morton, I am going to——

Mr. MORTON. I see the red light.

Mrs. MCMORRIS RODGERS. Yeah, it is already the red light. And what I would just ask is—I think we will have some more time to-

ward the end in Q&A for you to make some more of your points. Thank you very much.

Mr. MORTON. Thank you.

[The prepared statement of Mr. Morton follows:]

Statement of The Honorable Bob Morton, Washington State Senator

Chairwoman Napolitano, Ranking Member McMorris Rodgers, and Members of the Subcommittee, thank you for holding this important hearing regarding the benefits and future uses of hydropower.

My name is Bob Morton and it has been my pleasure and privilege to serve the 7th Legislative District since 1990 and the state Senate since 1994. I am currently the Ranking Member of the Natural Resources, Ocean and Recreation Committee and sit on the Water, Energy and Telecommunications as well as the Agriculture and Rural Economic Development committees.

For the past 70 years, since the construction of Bonneville Dam, the states of Washington, Oregon, Idaho, and Montana have relied heavily on hydroelectric power. There are 55 major and several minor hydroelectric projects on the Columbia, Snake, and Pend Oreille rivers and their tributaries. Twenty-nine of these projects are federal. The remaining are non-federal and include numerous Public Utility District (PUD) projects.

The Bonneville Power Administration (BPA) markets and distributes the power generation from the federal dams at cost-based-rates and receives no federal tax dollars for its operation. The Northwest ratepayers pay the costs of the BPA system. BPA supplies up to 45 percent of the electricity used in the Northwest, of which more than 80 percent is generated by clean, emissions-free hydropower. The Northwest exports hydroelectric power in the summer months derived from the melting snows of the north and imports electricity in the winter. The regions power supply totals 32,000 megawatts.

There are assumptions in some quarters that hydropower in the Northwest is tapped out. However, this is false. There are many undeveloped sites for hydropower generation where capacity can be tapped, for example, utilizing smaller turbine technology in tributary streams and by increasing the height of some of the present dams. Most of the hydroelectric dams of the Columbia Basin are non-storage dams that utilize the run of the river to generate electricity.

To transmit the electricity from its source to its user is a major part of the process. BPA owns, operates and maintains about 75 percent of the Northwest's high voltage transmission system. This includes interconnections and interregional transmission throughout the western grid system. The Columbia River Basin alone covers 260,000 square miles, an area roughly the size of France.

To ensure that benefits from the Columbia River hydropower system flow to the Northwest under federal law, BPA gives preference to Pacific Northwest utilities in power sales. BPA sells power outside the region, but only after the power has been offered within the region first and is surplus to regional needs.

In addition to being a reliable, affordable renewable energy source, a benefit of our hydro system is that it emits no greenhouse gases when it generates electricity.

According to the Northwest Power and Conservation Council, the average annual hydropower production in the Northwest is about 16,400 average megawatts, or almost 144,000,000 megawatt hours. If those same megawatt hours would have been generated by conventional coal plants, more than 153,000,000 tons per year of additional greenhouse gases would have been emitted. Hydro power is emissions free.

Another way of looking at this benefit is to consider what happens with carbon emissions when we have a low water year. For instance, in 2005, those emissions from the electric sector in the Northwest increased by 10,000,000 tons over average due to a below average water year. Because of that low water year, the region had to call on more thermal generators fired by fossil fuels to meet our needs. We need more water storage for future energy needs.

As you, the Members of Congress, engage in the dialogue about reducing greenhouse gas emissions, please remember that my state, indeed the country, is starting at a lower greenhouse gas emissions level than would have been without the Northwest's foresight to develop the hydroelectric generating system. We ask that you recognize this and other benefits of the hydro system and act to preserve, protect and enhance this very beneficial clean, renewable, domestic energy resource as you move forward with legislation to produce renewable energy, and energy security.

Thank you for this opportunity to appear before you today. I look forward to answering any questions you may have.

[NOTE: Attachments have been retained in the Committee's official files.]

Mrs. MCMORRIS RODGERS. Next we will move on to Robert Johnson.

STATEMENT OF ROBERT W. JOHNSON, COMMISSIONER, BUREAU OF RECLAMATION, WASHINGTON, DC

Mr. JOHNSON. Thank you. It is a pleasure to be here today and to provide the Department of the Interior's views on Reclamation's hydropower resources and the public benefits they provide.

While Reclamation is best known as the supplier of water, generating electricity is also a very important part of our mission. We characterize Reclamation as a water and power organization, and we are extremely proud of our role.

Hydropower is the most efficient way to produce energy. Each kilowatt hour of hydroelectricity is produced in an efficiency of more than twice that of thermal energy sources. Hydropower is extremely flexible, can rapidly change its output to match needs, going from no generation to maximum generation in a very short period of time.

Reclamation is not new to the power generation business. Since 1909, power revenues have contributed over $10 billion in project repayment for the Reclamation program. We operate 58 hydropower plants, which produce 44 million megawatt hours of electricity per year, enough to supply over 6 million households. The energy produced by Reclamation facilities replaces about 48.4 billion pounds of coal and avoids production of roughly 51 million pounds of carbon dioxide that would have been produced by fossil fuel power plants.

Our hydro plants also play an important role in reliability of the electric grid. Most traditional power plants cannot restart themselves in the event of a total loss of power. But hydroelectric generators, since they can be started without external power, could be used to restart the system in the event of a blackout. Reclamation has 18 of its hydroelectric power plants identified as part of these blackstart restoration plans.

Another benefit of hydropower is the revenue it creates for endangered species recovery. For Fiscal Years 2002 through 2006, Bonneville Power Administration hydropower revenues provided a rough average of $260 million for salmon recovery per year. This money has funded state-of-the-art programs to re-establish self-sustaining populations of endangered fish. Other hydropower facilities also provide funding for environmental programs throughout Reclamation.

Hydropower also enables other renewable power like wind generation to be more usable. Wind generation is intermittent, and it needs ancillary support services to be integrated into an electric grid. Hydropower provides this quick response necessary to enable getting wind-generated power to the load.

Having said all this, Reclamation faces many challenges in operation of its power plants. Traditionally, operation of power plants allowed for water releases to be timed so that generation coincided with the higher daytime electricity demand. This is referred to as "load following" and is one of the most significant benefits of hydro generation.

However, this traditional operation is no longer routine because of new endangered species and environmental requirements. For example, endangered fish and Grand Canyon National Park values below Glen Canyon Dam have modified that facility's operations, significantly reducing the capability for meeting daily energy demand. Reclamation has necessarily incorporated these types of environmental demands at a number of our other facilities, as well.

Through the cooperative efforts within the Department of the Interior and our customers and other stakeholders, it is possible to meet the various project purposes amidst these new demands. Reclamation has developed many innovative means of stretching existing resources to meet increasing demands or improve efficiency.

An example: Since 2005, five turbines at Hoover Dam have received new wicket gates, which allows increased gate openings so that more water can flow through the turbines. These actions have increased generating capacity by 70 megawatts. An additional 29 megawatts is projected to be installed within the next 3 years. We estimate that a conservative value of this new energy is $3 million per year.

The Bureau of Reclamation also has implemented benchmarking programs to compare its hydropower operations to the industry. We have found that our operations are competitive with other hydropower facilities, and we have also improved significantly our operations. An example would be at Hoover Dam we have improved our operations from being about average to actually resulting in a best-in-class determination for how we operate that plant and its efficiency.

In closing, hydropower is an important part of our mission, and we will continue to work with our customers to provide this invaluable natural resource.

This concludes my oral testimony. I am glad to respond to questions.

[The prepared statement of Mr. Johnson follows:]

Statement of Robert W. Johnson, Commissioner, Bureau of Reclamation, U.S. Department of the Interior

Madam Chairwoman and Members of the Subcommittee, I am Robert Johnson, Commissioner of the Bureau of Reclamation. I am pleased to provide the Department of the Interior's views on Reclamation's hydropower resources and the public benefits they provide.

Hydropower is a very efficient way to produce energy. Each kilowatt-hour of hydroelectricity is produced at an efficiency of more than twice that of any other energy source. Further, hydropower is extremely flexible and reliable. Hydropower can rapidly change its output to match needs—going from no power generation to maximum power generation in a short period of time.

While the Bureau of Reclamation is best known as a supplier of water for customers in the 17 western states, an equally important part of Reclamation's mission is the creation of electricity. In fact, we characterize Reclamation as a water and power organization. We are extremely proud of our hydropower program. Reclamation provides a clean, renewable source of power that has become an integral part of the electric system in the west.

Reclamation is not new to the power generation business. Since 1909, power revenues have contributed over $10 billion in project repayment to the Federal Treasury.

In an effort to provide an effective overview of Reclamation's hydropower program, I would like to divide my testimony into three parts:

1. Reclamation's Existing Hydropower Resources
2 RThe Current Challenges Facing Reclamation
3 RThe Opportunities Reclamation Sees in the Future

Reclamation's Existing Hydropower Resources

The Bureau of Reclamation manages water resources in the West. In the course of developing and managing these water resources, Reclamation built numerous projects with facilities that impound water to provide flood control and water supply for irrigation and municipal use. Along with those facilities, Reclamation constructed power plants to take advantage of the impounded water to generate clean, emission-free electricity that could also be used to finance the undertaking of the various projects.

Reclamation has 58 hydropower plants which, on an annual basis, produce over 44 million megawatt hours of electricity, enough to meet the needs of over 6 million households. Reclamation is the second largest producer of hydroelectric power in the western United States. It is worth noting that the energy produced by Reclamation facilities is the energy equivalent of replacing more than 80 million barrels of crude oil or about 48.4 billion pounds of coal. Further, Reclamation's facilities help to avoid the production of approximately 51 million pounds of carbon dioxide that would have been produced by fossil fuel power plants.

Reclamation produces power that has an annual value to its customers of slightly less than $1 billion. This offsets power that would otherwise cost over $3 billion as estimated by the Energy Information Administration. This is a significant benefit to the Nation's economy. After the hydropower is produced, Reclamation provides it to the Western Power Marketing Administration, which owns and operates the transmission lines and is responsible for marketing the power to its customers. The revenue collected from the sale of power to its customers is then deposited into the Treasury. The hydropower Reclamation produces is used for project purposes and then is provided to the Western Power Marketing Administration for sale to its customers.

Reclamation's hydropower plants also play an important role in the reliability of the electrical power grid. Most fossil and nuclear-fueled generating plants cannot restart themselves in the event of a total loss of power. Hydroelectric generators, since they can be started without an external power source, have traditionally been relied upon to restart the electric power system in the event of a blackout. As one of the largest owners and operators of hydroelectric resources, Reclamation has a key capability in restoration of the system, a function known as "blackstart." Reclamation has 18 of its hydroelectric power plants identified in blackstart restoration plans in the Western United States.

One other benefit of hydropower generation is the revenue that is collected and used to mitigate the impact of dam operations on fish and wildlife, including those listed for protection under the Endangered Species Act (ESA). A good example of this is the Bonneville Power Administration's (BPA's) use of hydropower revenues in the Columbia River Basin to avoid jeopardizing ESA-listed salmon stocks and to generally mitigate fish and wildlife affected by the Federal Columbia River Power System as required under the Pacific Northwest Electric Power Planning and Conservation Act. For Fiscal Years 2002 through 2006, BPA used hydropower revenues and borrowing authority repaid by revenues to provide an annual average of about $260 million for salmon recovery and mitigation efforts. This is nearly fifty percent of the average annual federal funding for Columbia River basin ESA implementation during the same time period. This money results from BPA's sale of hydropower produced at Reclamation and other facilities. This money has funded state of the art programs that are making a real difference in efforts to reestablish and maintain self-sustaining populations of endangered fish.

The Current Challenges Facing Reclamation

Reclamation faces many challenges in the operation of its power plants, which are operated to provide a variety of benefits. These benefits are derived not just from the actual quantity of water released and the power generated, but also from the timing of the release of water.

While the volume of water stored is a function of the weather, the timing of the releases for electrical generation usually is not. Traditionally, operation of the power plants allowed for water releases to be timed such that generation coincided with the higher daytime electricity demand. This is referred to as "load following" and is one of the most significant benefits of hydrogeneration. However, this traditional operation is no longer accepted as routine. The decisions on when to release the water are becoming more contentious as existing electric resources are unable to meet the electric demand and as environmental requirements increase.

For example, in accordance with the Grand Canyon Protection Act of 1992, the Glen Canyon Dam is now required to be operated to protect and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, in addition to the Dam's traditional authorized purposes. This has

resulted in modification of the facility's operations and has had an impact on meeting daily load following demand. Reclamation has experienced these and other types of environmental demands at a number of our hydroelectric generation dams. In addition, future conflicts between competing resource needs may be more pronounced in the face of still unknown, basin-level impacts from environmental factors such as global climate change.

Reclamation is one of many agencies and organizations that have been called upon to meet new challenges with existing resources, in ways that were never contemplated when our facilities were authorized, planned, and constructed. It is through cooperation and extensive dialogue within the Department of the Interior and among our stakeholders that the needs of the various project purposes are able to be met amidst these new demands. Through close interaction with the Fish and Wildlife Service, the National Park Service, the U.S. Geological Survey, the environmental community and our power customers, Reclamation develops operational regimes to meet a variety of goals across the West.

To do this we work closely with public entities that purchase power generated at Reclamation facilities to improve the quantity and quality of power. Reclamation has developed many innovative means of stretching existing resources to meet the increasing demands or improve efficiency. As an example, since 2005, five of the 17 turbines at Hoover Dam have received new wicket gates and equipment modifications have been made to increase the gate opening so more water is allowed to flow through the turbines. These actions have increased the generating capacity at Hoover by 70 megawatts (MW). An additional 29 MW capacity gain is projected within the next three years, when work on three more units will be completed. Using a conservative market price for capacity ($2,660 per MW-month), the value of 99 megawatts of new capacity at Hoover Dam is $3.16 million per year. The Bonneville Power Administration had directly funded 10 runner replacements at Grand Coulee Dam, creating 22.7 MW of additional energy per year.

Also, pressures to improve the quality and safety of the existing electric resources have added a new dimension to Reclamation's decisions. The electric reliability standards necessary to ensure delivery of power and provide for competition among electricity market participants don't always recognize the variable and sometimes conflicting nature of decisions concerning hydroelectric supply. Reclamation is working closely with other federal entities involved in hydroelectric power to identify ways to reduce costs and improve reliability.

This point also ties in with the challenges Reclamation faces from our aging infrastructure. We are working with our water and power customers on our infrastructure needs. As noted above, we are making improvements and upgrades where possible. With most of our power customers, we do not face the same financial challenges as with some of our water customers. Most of our power plants are directly funded by our power customers.

The Opportunities Reclamation Sees in the Future

The future will present many opportunities for Reclamation to continue its successful hydropower program. The most obvious opportunity is to enhance or expand our power production capabilities to meet the increasing demands of our power customers.

One of the most effective ways to improve efficiency is "benchmarking." In basic terms, benchmarking is a process by which an organization compares its systems against the best practices within an industry and then implements changes to improve system efficiency.

Reclamation uses benchmarking as a tool to ensure decisions on operation and maintenance are cost effective. Reclamation's cost to produce electricity is just over half of what the industry average is for hydropower plants. As a result of benchmarking, our operations at Hoover Dam went from average to best in its class.

We are also centralizing operations at Reclamation's Pick-Sloan Project and achieving efficiencies which benefit our power customers.

In closing, hydropower is an important part of our core competency. Our power customers are a highly valued part of Reclamation's overall program, and we will continue to work with them to continue to provide this important resource while at the same time balancing the many competing interests.

This concludes my written statement; I am pleased to answer any questions the Subcommittee may have.

Mrs. McMorris Rodgers. Thank you very much.

Next, Dr. Gruenspecht?

STATEMENT OF HOWARD GRUENSPECHT, DEPUTY ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION, WASHINGTON, DC

Mr. GRUENSPECHT. Thank you, Madam Chairwoman, Ranking Member McMorris Rodgers, members of the Subcommittee. I appreciate the invitation to testify today on the current and future role of hydropower.

The Energy Information Administration is the independent statistical and analytical agency within the Department of Energy. We don't promote, formulate or take positions on policy issues, unlike almost everyone else in Washington, and our views should not be construed as representing those of the Department of Energy or the administration.

In 2007, conventional hydroelectric power production accounted for 248 billion kilowatt hours of electricity, or 71 percent of total renewable generation in the United States. Most of the hydropower in the United States is located near the West Coast. In 2007, Washington, California and Oregon together accounted for 140 billion kilowatt hours, or 56 percent of total U.S. hydropower generation.

While hydro capacity has been relatively constant in recent years, annual generation has varied quite significantly, primarily due to changes in precipitation.

In its annual energy outlook, the Energy Information Administration publishes projections of supply and consumption to 2030 under the assumption that current laws and regulations remain in effect unless they are already scheduled to expire. In the projections issued earlier this year, less than one gigawatt of new conventional hydropower capacity is added by 2030 and generation holds steady at approximately 300 billion kilowatt hours.

It is important to note, however, that EIA does not yet include unconventional hydroelectric power technologies, such as wave, tidal or instream turbines, in its analysis since it is difficult to obtain reliable cost and performance estimates of technologies that are in their early phases of development.

Generation using other renewable energy technologies is projected to grow quite rapidly over the same period, reflecting the effects of high fossil fuel prices, the availability of production tax credits under existing law, and mandatory renewable energy portfolio standards in over half the States. And, again, as mentioned by the two previous witnesses, hydropower has an important role in complementing intermittent renewables.

The rules of State programs differ widely across the States. However, as a broad generalization, many State programs favor non-hydropower renewable energy sources over conventional hydropower.

Policy proposals to limit emissions of greenhouse gases that were touched on in the opening statements could have a significant impact on the mix of fuels used to generate electricity, in particular by reducing the use of conventional coal-fired generation, which currently provides about half the Nation's electric generation and roughly one-third of total U.S. energy-related emissions of carbon dioxide.

EIA has done analysis of many pieces of climate legislation, including the one that was considered in the Senate last week. And

in those analyses, we projected an increase of 1.5 to over 6 kilowatts of hydro capacity in 2030 relative to what we have in our reference case under current laws and regulations. And that range depends on the assumptions made regarding the cost and availability of low-emitting technologies, including nuclear fossil plants with carbon capture and storage and biomass. Many other renewables are affected to a much larger extent.

The relatively limited growth for hydroelectricity is largely due to the limited supply of sites on which hydropower can be expanded or created. Most existing sites have some potential for incremental capacity, but the list of new sites in which new dams can be constructed is short.

That said, there are some opportunities for conventional capacity improvements at exiting dams, as well as placing electricity turbines at sites that may be dammed but currently lack generators. As previously noted, our analysis did not consider wave, tidal or instream turbines, and that is another opportunity.

Finally, while policies to limit greenhouse gas emissions would likely create new market opportunities for hydro, it is important to recognize that climate change itself could have major implications for generation at existing hydropower facilities. Because hydro generation is so sensitive to climate variability and weather patterns, even small changes in temperature and/or precipitation patterns could have significant impacts. Hydro plants could also be impacted if there were a change in the number or intensity of extreme weather events, but it is really very difficult to know whether that would be the case or not.

This concludes my testimony, Madam Chairwoman. I would be happy to answer any questions you may have.

[The prepared statement of Mr. Gruenspecht follows:]

Statement of Dr. Howard Gruenspecht, Deputy Administrator, Energy Information Administration, U.S. Department of Energy

Madam Chairwoman and members of the Subcommittee, thank you for the invitation to testify today on the current and future role of hydropower. The Energy Information Administration (EIA) is the independent statistical agency within the U.S. Department of Energy. We are charged with providing objective, timely, and relevant data, analyses, and projections for the use of the Congress, the Administration, and the public. Although we do not take positions on policy issues, we do produce data and analyses to help inform energy policy deliberation. Because we have an element of statutory independence with respect to this work, our views are strictly those of EIA and should not be construed as representing those of the Department of Energy, the Administration, or any other entity.

In 2007, domestic conventional hydroelectric power production accounted for 71 percent of renewable generation, which, in turn, accounted for 8 percent of all power generated in the United States. This translates into 248 billion kilowatt hours of electricity, although the amount has varied quite significantly in recent years without dramatic changes in hydroelectric capacity. For example, 356 billion kilowatt hours were generated from conventional hydroelectric facilities in 1997, but these same plants produced only 217 billion kilowatt hours 4 years later. The wide variation in generation over this period is mainly a function of varying weather conditions, particularly changes in precipitation, since there was only a small change in installed capacity.

Most of the hydropower in the United States is located near the West Coast. In 2007, Washington, California, and Oregon together accounted for 140 billion kilowatt hours, or fifty-six percent of total U.S. hydropower generation. Lesser amounts were generated in New York, Montana, Idaho, Arizona, Tennessee and Alabama, which were the other leading hydroelectricity producers in 2007. The geographic concentration of hydropower production in the West explains why years with scare

precipitation and snowpack in that region can result in a dramatic reduction in total lower hydroelectric generation in the United States.

In its Annual Energy Outlook (AEO), EIA publishes projections of energy supply and consumption to 2030, under the assumption that current laws and regulations remain in effect unless they are already scheduled to expire. In the AEO2008 projections, issued earlier this year, hydroelectricity continues to play an important role in the electric power sector, but its share in overall generation falls. Less than 1 gigawatt of new capacity is projected to be added by 2030, and generation holds steady at approximately 300 billion kilowatt hours. This contrasts with the growth of other renewable energy technologies over the same period. By 2030, the 71-percent share of renewable power that hydropower currently holds falls to just below 50 percent of total renewable generation. Hydroelectricity's share of total renewable generation is projected to decline because of the rapid rise in generation by other renewable technologies. It is important to note that EIA does not yet include unconventional hydroelectric power technologies, such as wave, tidal, or in-stream turbines in its model. Although these technologies may play a significant role at some point in the future, it is difficult to obtain reliable cost and performance estimates of technologies that are in their early, experimental phase of development.

As noted, other renewable energy technologies are projected to grow at a much faster rate than hydropower. In the AEO2008 reference case, their growth is largely spurred by State renewable portfolio standards, and, in the very near-term, by the extension of the renewable energy production tax credit. Both of these are modeled in the EIA reference projection. The renewable energy tax credit is set to expire at the end of this year but will produce another year of strong wind power development. Currently, over half of the States have mandatory renewable energy standards. The rules of these programs differ widely among the States. Some States allow existing hydropower to be eligible in the State total, while others do not. Some have special mandates for non-hydropower renewable generation levels, meaning certain portions of renewable generation cannot be met through hydropower, even with incremental capacity. It is difficult to generalize from these vastly different programs, but generally they stress non-hydropower renewable energy sources over conventional hydropower.

Policy proposals to limit emissions of greenhouse gas emissions, which are not reflected in the AEO2008 reference case projections, could have a significant impact on the mix of fuels used to generate electricity. Coal-fired generation currently provides about half of the nation's electric generation, producing roughly one-third of total U.S. energy-related emissions of carbon dioxide. Conventional coal-fired power would remain a very attractive option to meet growing baseload capacity needs absent any concern over the future level of U.S. greenhouse gas emissions. However, a stringent policy to reduce U.S. greenhouse gas emissions would likely engender an implicit or explicit value for carbon dioxide emissions that is high enough to significantly affect the cost of generating electricity using coal. This would create a need for additional supply of electricity from low- and no-carbon generation sources.

In its recent analysis of S.2191, America's Climate Security Act of 2007, EIA projects an increase of 1.5 to 6.1 gigawatts of hydropower capacity in 2030—depending on the alternative case assumptions used—over the Annual Energy Outlook 2008 reference case in that same year. By comparison, there are between 40 and 275 gigawatts of new wind power capacity in the S.2191 cases than in the reference case in 2030. As is the case with hydropower, the wide range in wind power additions is driven by cost and availability assumptions for key low-emitting technologies, including nuclear, fossil plants with carbon capture and storage, and biomass facilities. When these technologies are assumed to be expensive or the ability to deploy them is limited, there is a much larger penetration of new wind and natural gas facilities. The relatively limited growth in the S. 2191 cases for hydroelectricity is largely due to the limited supply of sites on which hydropower can be expanded or created. Most existing sites do not have large potentials for incremental capacity, and the list of new sites in which new dams can be constructed is short. That said, there are some opportunities for conventional capacity improvements at existing dams, as well as placing electricity turbines at sites which may be dammed but currently lack generators. However, environmental concerns may limit such development and could lead to the retirement of some facilities when they come up for license renewal. As previously noted, our modeling did not consider wave, tidal, or in-stream turbines.

Finally, while policies to limit greenhouse gas emissions would likely create new market opportunities for hydropower and other low- and no-carbon generation technologies, it is also important to recognize that climate change itself could have major implications for generation levels at existing hydropower facilities. In a recent report, the U.S. Climate Change Science Program and the Subcommittee on Global

Change Research[1] pointed out that because hydroelectric generation is so sensitive to climate variability and weather patterns, even small changes could have significant impacts. Changes in temperature and/or precipitation patterns could both impact hydroelectric generation. Hydroelectric plants also could be impacted if there was a change in the number and/or intensity of extreme weather events. At this time, it is very difficult to quantify the potential impacts of such factors, and they are not reflected in our projections.

This concludes my prepared testimony, Madam Chairwoman. I will be happy to answer any questions you may have.

Mrs. MCMORRIS RODGERS. Thank you. I appreciate that.

Ms. Eden?

STATEMENT OF MELINDA EDEN, OREGON COUNCIL MEMBER, NORTHWEST POWER AND CONSERVATION COUNCIL, MILTON-FREEWATER, OREGON

Ms. EDEN. Thank you. Good afternoon, Mesdames Chair and members of the Subcommittee. On behalf of the Council, thank you for the invitation to appear here today.

The Council is a compact of the States of Idaho, Montana, Oregon and Washington created under the authority of the Northwest Power Act of 1980. Through its planning, the Council assures the Northwest region an adequate, efficient, economical and reliable power supply while also protecting, mitigating and enhancing fish and wildlife affected by hydropower dams in the Columbia River Basin.

I have basically four points.

First, the role of hydropower in the Northwest. With normal precipitation, hydropower dams in the Northwest provide about 15,500 average megawatts or about 75 percent of all the electricity used in the Northwest. Most of the remainder is provided by power plants that burn natural gas or coal.

The amount of electricity provided by other non-hydropower forms of renewables, particularly wind, is small but growing. Biomass plants provide less than 2 percent of the region's generating capacity. Geothermal and solar together provide less than 1 percent at this point. Wind power provides 4.7 percent, and that proportion is increasing.

Second, as a result of renewable resource requirements in three of the Northwest States, development of wind and other renewable power sources will continue to grow. In fact, development of renewables, particularly wind, has been growing steadily for nearly a decade. Since 2000, our region has gained nearly 3,500 megawatts of wind power.

That has important implications for hydropower, as others have mentioned, which provides back-up generation for times when the wind does not blow. One challenge we face is to integrate intermittent wind power into the power supply where it is critical that electricity flow at a steady, constant rate with no interruptions, even small ones.

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[1] U.S. Climate Change Science Program and the Subcommittee on Global Change Research, Effects of Climate Change on Energy Production and Use in the United States, U.S. Climate Change Science Program Synthesis and Assessment Product 4.5, October 2007.

As the title of this hearing indicated, hydropower is clean and renewable. Hydropower in the mix reduces the output from power plants that burn fossil fuels.

Last November, the Council reported the results of its year-long study of carbon dioxide emissions from Northwest power plants. The study demonstrates the moderating effect of the region's large hydropower base on carbon dioxide emissions otherwise produced by the power system, especially compared with other areas of the West with less hydropower and more thermal generation. For example, under normal water conditions, in 2005 the Northwest would have produced about 520 pounds of carbon dioxide for each megawatt hour of electricity generated compared to 900 pounds per megawatt hour for the rest of the West.

However, like other areas of the country, the Northwest faces the likelihood of rising greenhouse gas emissions, albeit at a slower rate than elsewhere. Moderating, slowing and eventually reversing this growth is a challenge for the Nation as well as for our region.

It will be difficult, according to our study, to achieve carbon-reduction goals with policies that focus only on new power plants. To achieve those limits, some exiting coal-fired plants in our region will have to be replaced with energy conservation and generators that produce little or no carbon dioxide.

Finally, Madam Chair, I want to highlight our energy conservation story. In the wisdom of Congress, the Northwest Power Act of 1980 treats cost-effective energy conservation as the highest-priority resource to meet future regional demand for power. Today, 28 years later, the importance of energy conservation is greater than ever before.

Energy conservation is unlike any other electricity resource. Conservation requires no fuel, requires no back-up resource, produces no emissions and requires no ongoing expense. Important in the Northwest, conservation also reduces pressure on the hydropower system and therefore increases its potential to serve as a backup for renewables, particularly wind.

Since 1980, the Northwest has achieved 3,700 megawatts of energy conservation. The accomplishment last year alone was 200 megawatts, an annual record for our region. Forty percent of the growth in electricity demand over the last 28 years has been met through conservation.

That amount, 3,700 megawatts, is equal to the electricity demand of Seattle, Portland and Boise combined. It is equal to seven large coal-fired plants that did not have to be built, 13.5 million tons of carbon dioxide that were not emitted into the atmosphere, and a savings to consumers of nearly $2 billion in 2007 compared to the cost of electricity from the wholesale market. The average cost of this conservation was less than $0.03 per kilowatt hour. The current cost of wind power is more than $0.08 per kilowatt hour.

Looking to the future, the Council will continue to rely on conservation. We have identified more than 3,000 megawatts of additional conservation that is also available at a cost of less than $0.03 per kilowatt hour.

That concludes our testimony. Thank you very much.

[The prepared statement of Ms. Eden follows:]

Statement of Melinda Eden, Oregon Member, Northwest Power and Conservation Council

My name is Melinda Eden, and I am one of two Oregon members of the Northwest Power and Conservation Council. I serve as Chair of the Council's Power Committee, which includes one member from each of the four Northwest states represented on the Council. On behalf of the Council, thank you for the invitation to present information at this hearing on hydropower.

The Northwest Power and Conservation Council is a regional planning agency. It is an interstate compact of the states of Idaho, Oregon, Montana, and Washington and was created by the state legislatures in 1981 under the authority of the Northwest Power Act of 1980. In the Power Act, Congress directed the Council to assure the Pacific Northwest region an adequate, efficient, economical, and reliable power supply while also protecting, mitigating, and enhancing fish and wildlife affected by the construction and operation of hydropower dams in the Columbia River Basin. As required by the Power Act, the Council produces a regional, 20-year Power Plan that guides the future resource acquisitions of the Bonneville Power Administration. The Power Plan also provides guidance to electric utilities in the region as they conduct their own resource planning. By law, the Council revises the Power Plan at least every five years. The Council's fish and wildlife mitigation is accomplished through the Columbia River Basin Fish and Wildlife Program, which by law is part of the Power Plan.

Through its planning, the Council works to ensure that the regional electricity supply remains low-cost and low-risk. It is important to protect and enhance the role of hydropower in the power supply by improving the efficiency of the region's electricity use, increasing the hydropower generation output of existing dams where feasible, continuing to mitigate effectively the environmental impacts of hydropower, and providing flexibility to support the development of renewable resources in the region.

In my testimony I will briefly discuss the Northwest power system; the record-setting gains in energy conservation in the Northwest in 2007; the future of hydropower in the Northwest; the Council's role in mitigating the impacts of hydropower on fish and wildlife of the Columbia River Basin; the rapid growth of wind power in our region and its impact on hydropower; and the important role hydropower plays—and will continue to play—in moderating greenhouse gas emissions from power plants that burn fossil fuels.

Pacific Northwest Electricity

Twenty-eight years of investment in conservation, along with a rapidly growing supply of wind power and our continuing reliance on hydropower, make the Pacific Northwest electricity supply among the cleanest and most efficient in the nation. The cornerstone of the Pacific Northwest electricity system is energy created by falling water—hydropower. Hydropower provides 61 percent of the region's electricity generating capacity. Most of the remainder is provided by power plants that burn natural gas or coal. Natural gas provides about 16 percent, and coal about 13 percent of the total capacity. There is one nuclear power plant in the region; it provides about 2 percent of the region's electricity. With normal precipitation, hydroelectric dams in the Pacific Northwest provide about 15,500 average megawatts of electricity, or about 75 percent of all the electricity used in the Northwest.

The amount of power provided by non-hydropower forms of renewable energy, particularly wind power, is small but growing. Biomass power plants provide less than 2 percent, geothermal and solar together provide less than 1 percent, but wind power provides 4.7 percent. As the result of renewable resource requirements in three of the Northwest states, development of wind and other renewable power will increase. In fact, it is increasing rapidly already. Since 2000, wind power development has increased by 3,463 megawatts in the region. In contrast, non-renewable natural gas-fired capacity has increased even more, however: by 5,403 megawatts during the same time period.

In the Northwest, hydropower is generated at both federal and non-federal dams. Most of the region's hydropower is generated at dams on the Columbia River and its tributaries. While there are both federal and non-federal dams in the Columbia River Basin, by far the largest portion of the hydropower supply is generated at federal dams. The Federal Columbia River Power System comprises 31 dams and one non-federal nuclear power plant. With normal precipitation, the energy produced by dams of the Federal Columbia River Power System is 9,098 average megawatts. Columbia River dams in the United States are operated in coordination with dams on the Columbia River and its tributaries in British Columbia under the Columbia River Treaty of 1964. This coordinated, international power supply is a model of bi-

national cooperation that other countries with transboundary rivers have sought to emulate.

In short, the Pacific Northwest is hydropower country. The region has a long history of hydropower development. The first dams generated electricity on Columbia River tributaries in the late 1880s, just a decade after Thomas Edison invented the light bulb. The first dam across the mainstem of the Columbia River was completed in 1933. This dam, Rock Island, was built by a privately owned utility. Federal construction projects began that year at Bonneville and Grand Coulee dams. Bonneville was completed in 1938 and Grand Coulee in 1941. The last of the federal dams were completed in the 1970s.

Electricity generated at the federal dams in the Columbia River Basin is sold by the Bonneville Power Administration, a federal power-marketing agency. The electricity is sold for the cost of its generation. Over time, that cost has increased as additional components have been added—for example, costs associated with Bonneville's share of the region's debt for financing nuclear power and the cost of mitigating the impacts of hydropower on fish and wildlife.

Importantly, the Federal Columbia River Power System is almost entirely self-financing. Costs associated with the dams are paid by those who use them. For example, customers of hydropower pay for the hydropower facilities through the rates charged for the electricity.

Energy Conservation: The Highest-Priority Resource in the Northwest

While hydropower is the most important generating resource in the Northwest, the Northwest Power Act of 1980 treats cost-effective energy conservation as a resource equivalent to power generation and the highest-priority resource to meet future regional demand for power. Energy conservation means reducing demand for electricity by improving the efficiency of electricity use. Conservation is not only the most important future electricity resource for the Northwest, it is the most cost-effective as well.

In focusing on energy conservation 28 years ago, Congress was quite far-sighted. Today, with gasoline prices hovering around $4 per gallon and with increasing public concern about greenhouse-gas emissions, global climate change, and the monetary and environmental cost of energy, the importance of energy-use efficiency is greater than ever before. Energy conservation is unlike any other electricity resource. There is no fuel, and therefore no ongoing fuel costs or associated risk of volatile prices. Conservation requires no backup resource to shape its output to meet demand. Conservation is not a fuel we import from a foreign country so there is no risk of supply shortages or curtailments. There are no emissions, and therefore no risks to the climate. There is no ongoing cost after the resource is installed—except, for example, when a compact fluorescent light bulb burns out and needs to be replaced. Importantly in the Northwest, by reducing demand for power, conservation reduces pressure on the hydropower supply and therefore increases its potential to serve as a backup for renewable energy, particularly wind power.

Western states are national leaders in energy conservation as the result of impressive efficiency improvements in California and the Northwest states. In the Northwest since 1980, demand for electricity has been reduced by 3,700 megawatts. Fifty-one percent of that amount—1,913 megawatts—has been achieved since 2000.

These efficiencies resulted from multiple sources including new building codes, the effects of national energy efficiency standards, and programs and incentives offered by states, the Bonneville Power Administration and the region's public and investor-owned utilities. The average cost of this conservation was less than 3 cents per kilowatt-hour. The current cost of wind power, by comparison, is more than 8 cents per kilowatt-hour.

Expressed as electricity generation, 3,700 megawatts is enough power to supply the entire state of Idaho and all of western Montana, with 400 megawatts left over. Put another way, 3,700 megawatts is the equivalent of seven, 500-megawatt coal-fired power plants that did not have to be built; 13.5 million tons of carbon dioxide that were not emitted into the atmosphere; and a savings to consumers, compared to the cost of electricity from the wholesale market, of nearly $2 billion per year in 2007.

The Council is pleased to report that in 2007 the Northwest set a one-year record for energy conservation, an achievement of 200 megawatts. The largest share of this savings was in the residential sector, and the largest contribution to that savings—60 percent of the residential savings—was compact fluorescent light bulbs. Between 18.5 million and 19 million bulbs were sold in the Northwest last year—more than any other region of the United States in terms of bulbs per person. Looking to the future, the Council has identified more than 3,000 additional megawatts of conservation that is available, also at a cost of less than 3 cents per kilowatt-hour.

Future Hydropower Development in the Pacific Northwest

With more than 360 hydroelectric dams in the Pacific Northwest, hydropower is by far the most important generating resource in the region. However, hydropower is not the most important source of meeting future demand for power. That is because most of the economically and environmentally feasible sites for hydropower generation have been developed. The remaining opportunities, though numerous, are for the most part small-scale and relatively expensive.

Hydropower and Fish and Wildlife in the Columbia River Basin

Upgrades at existing dams could improve survival of migrating fish. Examples are installation of fish-friendly turbines and screens to guide fish away from the turbine entrances. This is not to suggest that such upgrades would render hydropower dams completely benign in terms of environmental impacts. Spill reduces power generation at dams on the Columbia and Snake rivers by about 1,200 megawatts to help juvenile salmon and steelhead migrate to the Pacific Ocean. Water is directed over spillways instead of through turbines. In the Power Act, Congress recognized that hydropower dams have impacts on fish and wildlife. One of the Council's three principal responsibilities, in addition to power planning and public information, is to protect, mitigate, and enhance fish and wildlife, and related spawning grounds and habitat, that have been affected by the construction and operation of hydropower dams in the Columbia River Basin. We fulfill this mandate through the development and implementation of the Columbia River Basin Fish and Wildlife Program.

The program provides protection for fish and wildlife from the effects of future hydropower development as well as from existing projects. Beginning in 1989, the Council included in the fish and wildlife program a set of standards for the Federal Energy Regulatory Commission (FERC) and others to apply to the development and licensing of hydroelectric facilities in the Columbia River Basin. FERC is one of the federal agencies that is required to take the Council's fish and wildlife program into account in its decision-making. The standards include designating certain river reaches in the basin as "protected areas," where the Council believes that hydroelectric development would create unacceptable risks of loss to fish and wildlife species of concern, their productive capacity, or their habitat.

New Renewable Resources in the Northwest

Wind power is proliferating rapidly in the Northwest. This has important implications for hydropower. One challenge we face is to integrate wind power, which is intermittent depending on the strength of the wind, into the power supply where stability is critical. To address this issue and others related to wind power, the Council and the Bonneville Power Administration convened a task force to study wind integration. An important conclusion of this wind-integration analysis has implications for the region's hydropower supply. According to the analysis, there are no technical barriers to integrating up to 6,000 megawatts of new wind-power capacity into the regional power supply (new transmission lines would be required after the first 3,000 megawatts). Six thousand megawatts is the amount of new wind power development envisioned for the 2004-2024 period in the Council's Fifth Power Plan. However, the cost of this wind power will depend on the flexibility of the hydropower system to provide backup generation at times when wind-power output declines.

When wind energy is added to a utility system, its natural variability and uncertainty is combined with the natural variability and uncertainty of loads. During times of very hot or very cold temperatures, the wind often does not blow. As a result, there is an increase in the need for hydropower flexibility required to maintain utility-system balance and reliability. According to the analysis, the cost of wind integration starts low, particularly when integrating with a hydropower system that has substantial flexibility, and then rises as increasing amounts of wind are added. Siting wind turbines in geographically diverse areas can help reduce costs. Ultimately, costs plateau at the cost of integrating wind with natural gas-fired power plants.

With increasing amounts of wind power in the regional power supply, there likely will be times when large, unexpected increases in wind output coincide with periods of limited hydropower flexibility. If other sources of flexibility are not available at the same time, system operators may need to limit wind output for brief periods in order to maintain reliability.

Moderating the Carbon Dioxide "Footprint" of the Northwest Power Supply

As the title of this hearing asserts, hydropower is clean and renewable. Hydropower in the mix of electricity-generating resources reduces the amount of electricity produced by power plants that burn fossil fuels, and therefore the amount of carbon

dioxide and other greenhouse gasses released into the atmosphere from those plants. In November 2007, the Council reported the results of a year-long study of carbon dioxide emissions from the Northwest power plants.

The results demonstrated the moderating effect of the region's large hydropower base on carbon dioxide emissions from the power supply, compared to other areas of the West with less hydropower and more thermal generation. For example, under normal water conditions, in 2005 the Pacific Northwest would have produced about 520 pounds of carbon dioxide for each megawatt-hour of electricity generated, compared to 900 pounds for the entire western interconnected power system.

However, like other areas of the country, the Northwest faces the likelihood of increasing greenhouse gas emissions—albeit at a slower rate than elsewhere. Moderating, slowing, and eventually reversing this growth is a challenge for our nation as well as for our region. Carbon dioxide emissions in the Northwest, thanks to hydropower, are already comparatively low. Forcing them to go lower will be a challenge for the Northwest. We face this challenge because the Northwest has essentially the same set of future electricity-generating options as the rest of the country. Unlike other regions of the country, however, the Northwest has the Council's Northwest Power Plan to guide future resource development. The plan follows the resource priorities in the Power Act. The priorities are: first, cost-effective energy efficiency (conservation); second, cost-effective renewable energy; third, high-efficiency thermal generation; and fourth, traditional thermal generation.

The base case of our analysis of carbon dioxide emissions from the Northwest power supply assumed implementation of the resource recommendations in the Fifth Power Plan, which includes aggressive development of energy conservation and renewable resources, particularly wind power (the Fifth Power Plan was completed in 2004; the Council is working on the Sixth Power Plan now and plans to finish it in mid-2009). According to the study, carbon dioxide emissions in the Western Electricity Coordinating Council (WECC) area increase about 3 percent to about 920 pounds per megawatt-hour by 2024, whereas the Northwest rate, with aggressive development of energy efficiency and renewable energy, also increases 3 percent to about 530 pounds. The future growth rate of annual regional carbon dioxide production would be even higher if the conservation, wind power, and other renewable resource development called for in the Council's Fifth Power Plan were not accomplished. With implementation of the Council's plan in the base case, the annual carbon-dioxide production of the regional power system in 2024 under normal conditions would be about 67 million tons, an 18-percent increase over normal 2005 levels.

Carbon-Reduction Policy Focus

An important finding of the carbon dioxide analysis is that it will be difficult to achieve goals for carbon-dioxide emissions with policies that focus only on new power plants. If the energy efficiency targets of the Council's Fifth Power Plan were achieved and renewable energy portfolio standards were successfully implemented by all Northwest states, projected power-system carbon-dioxide emissions in 2024 would exceed normalized 2005 levels by more than 10 percent, and actual 1990 levels by more than 40 percent. Put another way, meeting the aggressive energy efficiency and renewable portfolio standards would slow, but not eliminate, growth of carbon-dioxide emissions. Even worse, if the region fails to meet the conservation targets in the Council's Fifth Power Plan, or if hydropower generation is reduced from current levels and the power replaced with new thermal generation, the effect would be a net gain in carbon-dioxide emissions over time.

Overall, the effects of the various scenarios addressed in the analysis, all of which are consistent with current policies that address future, and not existing, thermal power plants, yield a reduction of carbon-dioxide emissions equal to the output of one or two coal-fired power plants. In the Fifth Power Plan, the Council's forecast for regional carbon-dioxide production by the power system in 2024 exceeds 1990 levels by an amount equivalent to eight coal-fired plants. These results illustrate the difficulty of reducing carbon dioxide production with policies that affect only new sources of electricity generation. Existing coal-fired power plants dominate carbon-dioxide production from electricity generation. These plants provide about 23 percent of the region's electricity but 85 percent of the carbon-dioxide emissions from the regional power system. To stabilize carbon-dioxide emissions at 2005 levels or to reduce emissions to 1990 levels would require replacing the output of some of these existing coal-fired plants with additional energy conservation and other resources that produce little or no carbon dioxide. In addition, the analysis shows that policy choices made for purposes other than carbon-dioxide reduction, such reducing hydropower generation to improve environmental conditions for migratory fish, also can have significant adverse effects on carbon-dioxide production. In fact, the effect

could be great enough to negate the carbon-reduction goals of state renewable portfolio standards.

Thank you again for the opportunity to testify at this hearing. Through the Council's planning processes for future power supplies and fish and wildlife protection, we are working to ensure that our region's hydropower-dominated electricity supply remains clean, reliable, and affordable.

Mrs. MCMORRIS RODGERS. Very good. Everyone is being quite timely here. Thank you.

Let's see. Next is Mr. English.

STATEMENT OF THE HON. GLENN ENGLISH, CHIEF EXECUTIVE OFFICER, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, ARLINGTON, VA

Mr. ENGLISH. Thank you very much, Madam Chair. I appreciate that. Let me just say I am delighted to be here. Thank you for the opportunity of testifying on behalf of the electric cooperatives across this country.

I will bring you a little different perspective and perhaps an appreciation of just how important hydro is going to be for the future.

I think we all recognize and understand that we are likely to see climate change legislation pass in the not-too-distant future. Given the position of the two political nominees of major parties, it is very likely we are going to see climate change law in the not-too-distant future.

What is not recognized, I don't think, and received nearly as much attention is the fact that the generation capacity in this country is pretty much exhausted. We built excess capacity back in the late 1970s, early 1980s. That is pretty much gone. And given what the Energy Information Agency has projected for the year 2030, we are told we are going to have about a 30 percent increase in demand over and above what we have today, some 264 gigawatts of power.

And the real question that we have facing us is obviously a time in which additional generation needs to be built, and that has to be balanced with what climate change legislation may pass the Congress.

And, in the next decade, that could be a very serious pinch. The reason that I say that is due to the fact that already we are seeing a chilling effect of the use of the primary fuel that we have, as far as generation in this country, and that is coal-fired generation. Nationwide, it is roughly half of all the generation is coal-fired. And we are seeing those plants that were on the drawing boards are now being shifted into primarily natural gas.

That is obviously going to have a serious impact as to the ability of the country to be able to meet the demand needs. That means we have to have a lot of production out of efficiency and a lot out of renewables.

I am very proud to say that I am one of the steering committee members for the national organization of "25 x '25," which has as its national objective 25 percent of our energy produced by the year 2025. I am also very pleased to say that that organization fully recognizes that hydro is a renewable and must play a very important role as far as the mix for the future.

The fact of the matter is, Madam Chair, up to this point, whether you talk about Democratic or Republican administrations, I am not sure that we have seen the proper respect and appreciation for the contribution that is made by hydro in this country, and certainly what is going to be necessary for the future.

The bottom line is, if, in fact, we are going to keep the lights on in this country, we are going to need the full productive capacity of hydro in this Nation. And that means that we have to have upgrades and improvements in the existing facilities and any additional contributions that can be made. And that, I think, is a very important role indeed.

As we look at the fact that both the Corps of Engineers and the Bureau of Reclamation today practice a breakdown maintenance approach, which seriously impairs the capacity to generate the full capacity of our hydro plants, that is obviously a policy that needs to be changed and changed very rapidly.

I would suggest that any time we have a breakdown, any time we have a generator shutdown, what it means is that particular entity, in order to acquire power, must in fact buy on the open market. And, most likely, the power that must be purchased is going to be power that is adding to the climate challenge, making it more difficult for us to obtain any gains that the Congress and the new President may lay down to us.

So I think it is extremely important for us to look ahead. It is my understanding that we have a Government report now underscoring the fact that 2,500 megawatts, or approximately the output of four coal-based power plants, could be displaced through the rehabilitation and additional development of the hydroelectric resources. That is something that the country desperately needs, and we need that contribution.

So, at the present time, I know many of our members, who are a part of the Federal preference customer group, are providing funding and rehabilitation on their own. They are taking money out of their own pocket and making the contribution to make these rehabilitations. The Western States, in WAPA, their footprint, they funded almost $50 million in rehabilitation needs, but they can't do it all alone.

So what we need is, obviously, for the Congress and the new administration to recognize the importance of hydro, the importance it has to play in meeting any climate change goals, the importance that it is going to play in the future in meeting this additional demand need, and certainly the importance in trying to keep electric bills down in this Nation.

So, Madam Chair, I want to applaud the fact that you are having this hearing, applaud the fact that you recognize the importance of hydro. And I hope that you are able to spread to your colleagues the very important role that hydro will have to play if this country indeed is going to keep the lights on and meet its needs.

Thank you very much.

[The prepared statement of Mr. English follows:]

Statement of The Honorable Glenn English, C.E.O., National Rural Electric Cooperative Association

Chairwoman Napolitano, Ranking Member McMorris Rodgers, and Members of the Subcommittee:

My name is Glenn English, and I am the Chief Executive Officer of the National Rural Electric Cooperative Association (NRECA). I appreciate the invitation to appear before you today to discuss hydropower issues. NRECA is a trade association consisting of nearly 1,000 cooperatives providing electricity to 41 million consumers in 47 states. As member-owned, not-for-profit organizations, cooperatives have an obligation to provide a reliable supply of electricity to all consumers in our service areas at the lowest possible price. We take our obligation to serve very seriously—the personal and economic health of our members, our communities, and our nation depends on it. Cooperatives serve primarily the more sparsely populated parts of our nation but cover roughly 75 percent of the nation's land mass.

In the early stages of this nation's hydropower program, electric cooperatives agreed to a partnership with the federal government. Electric cooperatives agreed to pay what were then significantly higher costs for power in exchange for a guarantee of a secure, reliable cost-based power resource. This partnership provided the basic structure for real competition between consumer-owned and large investor-owned utilities. Today the federal hydropower program remains a very important source of power for more than 600 electric cooperatives. In total, 50 million people nationwide share the benefits of the federal hydropower program. The Energy Information Agency (EIA) reports that hydropower accounts for nearly 75 percent of the country's renewable energy supply, while meeting seven percent of consumers' total energy needs.

To fully appreciate the future role of hydropower—and its importance—I believe the Subcommittee should know the energy challenge facing this nation and how electric cooperatives are reacting to this challenge. Frankly, I believe that Congress is focused on one half of the looming challenge—but the other half is critical though it has not received the same spotlight as global climate change. This is the fundamental question of whether the nation will have enough electricity capacity to meet consumer energy needs.

EIA has projected that electricity demand will grow 30 percent by 2030, requiring 264 gigawatts of electricity. To better understand the magnitude of this challenge, consider that 264 gigawatts is 2.5 times the power now generated in the state of Texas. The more critical and immediate problem will come in the next ten years. Members of the Subcommittee are well aware of the opposition to building new coal-fired generation, as well as the massive undertaking needed to enlarge our fleet of nuclear power plants. Even taking increased energy efficiency into account, the nation will still need 118 gigawatts of new generating capacity by 2020. Natural gas will clearly play a crucial role, but we will need every source of electric power generation at our disposal. We simply cannot wait. In some regions, demand will soon outstrip capacity unless generation and transmission are added, leading Richard Sergel, CEO of the North American Electric Reliability Corporation, to state: "We're close to the edge...We need action in the next year or two to start on the path to having enough electricity 10 years from now." I have attached a map to my testimony showing the near-term dates when many regions will face an electricity capacity shortfall.

Among electric cooperative consumers, demand growth is projected at about double the national average. Electric cooperatives take seriously our responsibility to meet our consumers' electricity needs, while also taking a leadership role in the development of renewable energy. More than ever before, renewable hydropower must be part of the diverse mix of fuels to meet our consumers' needs.

As a member of the steering committee of the 25x25 Ag Energy Working Group, NRECA worked with Congress to include the goals of the 25x25 action plan in the Energy Independence and Security Act of 2007.[1] The action plan calls for the United States to produce 25 percent of its electricity from renewable energy sources by 2025. During the Working Group process, I argued that hydropower must be included in the definition of a renewable. I was pleased that language in the 25x25 action plan recommended that "America must rapidly increase centralized and decentralized renewable electricity generation, taking advantage of biomass, geothermal, hydropower, landfill gas, biogas from animal operations and other organic waste, solar, and wind, as well as thermal uses." This type of recognition of hydropower as a renewable is long overdue.

It's important to note that electric cooperatives continue to develop their own sources of renewable energy through aggressive use of the Clean Renewable Energy Bond (CREBS) program included in the Energy Policy Act of 2005. So far, 40 electric cooperatives have developed or are developing $430 million worth of renewable

[1] Sec. 806 of the Energy Independence and Security Act of 2007. 25 x 25 Action Plan. http://www.25x25.org/storage/25x25/documents/IP%20Documents/Action__Plan/actionplan__64pg__11-11-07.pdf

energy projects using this program. This project portfolio includes $60 million for new incremental hydropower projects.

In addition, cooperatives across the country recently formed the National Renewables Cooperative Organization (NRCO) to accelerate the development and deployment of renewable energy resources. Since it has become increasingly difficult to build new baseload generation, electric cooperatives recognized we must produce as much power as is technologically and economically possible from renewable sources. Formed in March of 2008, NRCO already has 24 member co-ops who collectively serve 23 million Americans in 36 states. NRCO reflects the commitment of cooperatives around the country to the responsible development of cost effective renewable resources in a manner that benefits their consumers, their communities, and the nation as a whole. The NRCO will allow cooperatives to pool expertise in developing renewable energy, share access to sites that are conducive to renewable production, and potentially lower the high capital costs of these projects.

The NRCO and CREBS will help stimulate development of renewable resources in the future. In the meantime, the federal government is overlooking its largest and most long-standing renewable resource: hydropower.

For more than 100 years, the federal government has developed hydropower capabilities at the multi-purpose projects of the Bureau of Reclamation (Bureau) and U.S. Army Corps of Engineers (Corps) across the country. These projects serve a variety of needs (flood control, irrigation, municipal and industrial water, and recreation) and play an important role in local, regional and national economic development. Preference customers purchasing this power are repaying the federal government's hydropower investment. There is no subsidy.

The multi-purpose projects of the Corps and Bureau generate enough emission-free hydropower each year to displace 85.5 million metric tons of CO2. The Subcommittee may be interested in the positive environmental role each of the four Power Marketing Administrations play in the displacement of CO2.

The Bonneville Power Administration (BPA) generates 72,307 gigawatt-hours of hydropower, annually displacing 56.2 million metric tons of CO2. One of the federal dams in BPA's footprint, the Grand Coulee Dam, with which the Ranking Member is very familiar, has the potential to produce almost 7 gigawatts of electricity. That's enough power to displace the emissions of more than 10 coal-fired power plants.

The federal hydropower marketed by the Southwestern Power Administration produces an average of 5,570 gigawatt-hours of clean renewable hydropower annually. This energy production reduces emissions of carbon dioxide by 4.6 million tons per year.[2] Projects in the Southeastern Power Administration (Southeastern) play a similar role in mitigating carbon emissions. Southeastern's generation of 5,232 gigawatt-hours in Fiscal Year 2007 offset carbon dioxide emissions by 4.4 million metric tons.[3] In the Western Area Power Administration, 26,159 gigawatt-hours in Fiscal Year 2007 offset the equivalent of 20.3 million metric tons of CO2.

Unfortunately, the hydropower capabilities at federal dams have been compromised by years of insufficient funding, even though federal hydropower investment is repaid with interest to the U.S. Treasury.

Starting in the late 1970s and continuing to present day, the hydropower facilities at these multi-purpose projects have not been adequately maintained or kept up-to-date. By abandoning its stewardship of this important national resource, the federal government has compromised the reliability of federal hydropower generation at a time when renewable energy resources are increasingly important in the effort to reduce carbon emissions as well as meet growing electricity demand.

Let us heed the words of Chairman Peter Visclosky in the FY 2008 House Energy and Water Appropriations Committee report:

> "Energy security and issues of global climate change are increasingly important to the decisions made regarding infrastructure investment. Hydropower improvements at existing facilities provide a reliable, efficient, domestic, emission-free resource that is renewable."[4]

Unfortunately, the Corps and Bureau have practiced "break-down" maintenance—only fixing or replacing units when they break instead of performing routine maintenance to keep federal hydropower projects running at their most efficient capacity. Fortunately, a blueprint now exists to address this problem.

A little-known section included at the end of the Energy Policy Act of 2005 mandated that the Bureau of Reclamation and the Corps of Engineers inventory the

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[2] Testimony of Jon Worthington, Administrator Southwestern Power Administration, before the House Subcommittee on Water and Power, February 26, 2008

[3] Testimony of Leon Jourolmon, Acting Administrator Southeastern Power Administration, before the House Subcommittee on Water and Power, February 26, 2008.

[4] House Energy and Water Appropriations Committee Report FY 2008.

amount of additional hydropower possible through the rehabilitation of existing federal dams and additional development at these facilities.

The report found 64 sites warranting "...further exploration for additional hydropower development,"[5] potentially resulting in the addition of 1,230 MW. By rehabilitating existing hydroelectric facilities, an additional 1,283 MW of emission-free hydropower could be produced. In total, 2,500 MW or the approximate output of four sizable coal-based power plants could be displaced through the addition and rehabilitation of these hydroelectric resources.

Let me be clear. This is not a Republican or Democratic issue. Successive administrations—under the direction of the Office of Management and Budget—have failed to put sufficient resources into the power function of these facilities, allowing many parts of the federal power system to fall into disrepair. When hydropower units are down, preference customers are forced to buy power from the open market, which is frequently fossil-based and more costly.

Wolf Creek Dam in Kentucky epitomizes this problem. In 2006, the Corps of Engineers implemented emergency measures to prevent a catastrophic failure of this dam. Due to the lowering of the reservoir behind the dam, approximately 312 megawatts of hydropower generation has been lost.

Wolf Creek is but one example of a system that is failing to operate efficiently. The problem runs rife through the Federal Power System. In the Southwestern Power Administration service territory, ten percent of the units generating hydropower are out of service because they need to be fixed or outright replaced. This total outage amounts to 132 Megawatts.

The problem was compounded this spring when several dams could not take advantage of above average rainfalls in Missouri and Arkansas. In one instance, the Truman Dam in Missouri was unable to realize its true hydropower potential due to a transformer failure. This failure precluded three of its six generators from operating during this unique opportunity to generate excess hydropower.

In many cases, preference customers have stepped in to provide funding for the rehabilitation of these facilities. A group of Western Area Power Administration customers known as the Western States Power Corporation has funded projects rehabilitating hydroelectric facilities of the Corps and Bureau to the sum of $45.8 million. Unfortunately, Western States members simply cannot advance fund all of the federal hydropower program's repair needs while at the same time maintaining their own generation infrastructure and developing new sources of renewable and conventional generation. It must be a federal priority and a continuation of the federal hydropower commitment to consumers.

Some have called for the breaching of our federal dams. This would be completely counter to the long-standing federal hydropower commitment and policy. This is not the time to create additional energy challenges for this country. Nor is it time to adopt misguided proposals initiated by OMB that seek to change the repayment terms of the PMAs. We must invest in our federal hydropower infrastructure and reverse the "break-down" maintenance practice that has put the federal hydroelectric infrastructure in such a dire state of disrepair.

NRECA urges Congress and future Administrations—Republican or Democrat—to take all steps necessary to maximize the reliability and efficiency of the existing federal hydropower assets and to identify and pursue all opportunities to expand these facilities. These assets are an essential part of the national strategy for addressing global climate change and ensuring that consumers have enough electricity.

Thank you for the opportunity to testify. I will be happy to answer any questions you might have.

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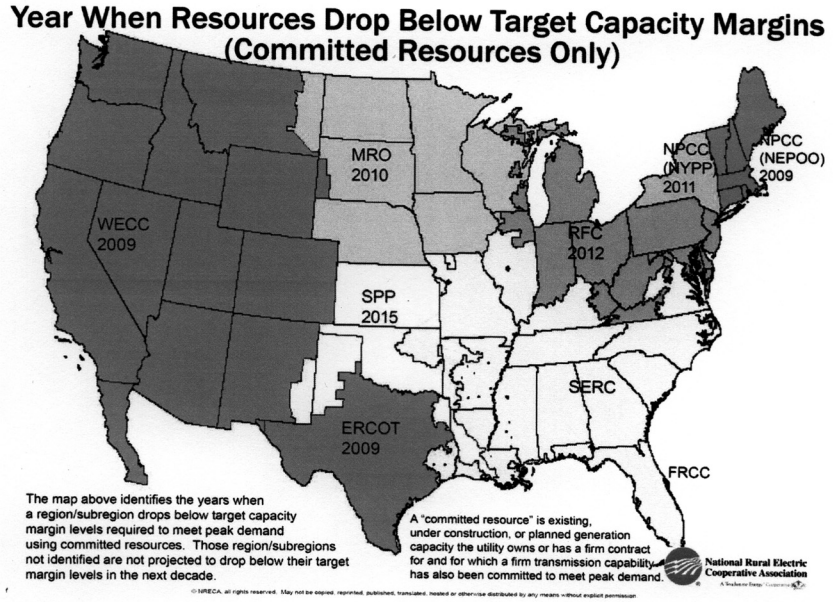
[5] Potential Hydroelectric Development at Existing Federal Facilities, U.S. Departments of the Interior, Army and Energy, May 2007.



Mrs. MCMORRIS RODGERS. Thank you.

And excellent testimony by everyone. Again, appreciate you being here.

I would like to just ask a question that each panelist can answer, and it does relate to electricity demand. And as we think about the next 20 years, there is a lot of differing opinions as to how we are going to meet electricity demand in this country. And some think that new generation isn't necessary, that we can meet the demand through conservation, efficiency.

I would just like to hear from you your perspective on the need for new generation and if you believe there is an opportunity for expanded hydropower generation.

Mr. MORTON. I take it you are looking at me to start off with that.

Mrs. MCMORRIS RODGERS. Well, if you would like.

Mr. MORTON. Again, thank you for allowing us to also share in the questions and answers.

The most exciting thing I see for the future—and I don't think there is any argument but that we need more power when we increase our industrial output, we increase our population.

The most exciting thing that we have seen so far is the, I am going to call it, RITE Project in the East River of New York City. So here we are way out in the other corner of the United States looking at it. The Public Utility District of Okanogan has looked seriously at this as a project that may be able to be included in the Columbia River itself.

The RITE Project in New York—and I have addendums on it somewhere in your literature there—is placing turbines beneath the surface of a flowing stream of water. In our case, we are look-

ing seriously at the Columbia River as a possibility for putting these many fixtures in that would generate power.

So we see that as a strong possibility the committee might want to consider and get more information on.

Mrs. MCMORRIS RODGERS. Anyone else?

Mr. GRUENSPECHT. In our outlook to 2030, we do see growth in electricity demand, certainly much less than in the past. When I was a kid, electricity demand was increasing 6, 7, 8 percent a year, so electricity demand would double every 10 years. Now we are looking at growth, much lower rate, maybe 1.1 percent in our base case. But over time, as has been discussed, that does add up. After 2030, you are looking at something like close to 30 percent.

As was discussed earlier, we have been relying on existing capacity, for base load in particular, that was built. We haven't built much new coal, much new nuclear. We have built a lot of gas recently, although running those gas plants is very expensive. So, over time, the capacity factors on our existing nuclear and our existing coal plants have gone up. And it is not very attractive because of climate change to build more coal plants, if we are really going to be serious about reducing greenhouse gas emissions.

So there is need for base load generation of some sort. Conventional hydro, you know, we think there are opportunities for improvements in addition to the existing sites. History suggests that new sites may be quite difficult.

But, as discussed by several of the witnesses, some of these new technologies, frankly, like the hydro kinetic technologies, could matter. That includes both instream power; it could also include the wave power, which is grouped into that. But it is early days for those, and we don't really include those in our base yet. But there may be an opportunity there.

Thank you.

Mrs. MCMORRIS RODGERS. Thank you.

Mr. ENGLISH. Madam Chair, I would suggest this. Common sense tells you that we are going to have to have more generation if you are going to eliminate the primary fuel that we have had in this country for most of the last century, namely coal. And that is basically what we are going to do with climate change legislation until we have the technology for carbon capture and storage. And it is anticipated that that technology will not be available until well after 2020. So for the next decade or so, we are going to primarily be shifting to natural gas.

And, obviously, we are going to need all the help that we can get out of efficiency, we are going to need everything we can get out of renewables, and we are going to have to have a real stretch here to be able to meet the power needs of this country and take care of the demand that EIA has forecasted. That is 118 gigawatts here in the next 10 years of demand that has to be consumed in some way, dealt with in some way.

To give you some idea of the magnitude of what we are talking about, in the next 20 years, we are talking about roughly two and a half times the amount of power that is produced in the State of Texas, about four times what is produced in California. So it is a tremendous amount of power that has to be acquired in some fashion, either reducing the demand, increasing existing capacity capa-

bilities, and certainly renewables. And hydro can play a major role in that.

But I think it underscores once again that if we are going to do this and do it with an ambitious schedule on meeting climate change objectives, then obviously we have to maximize what we can get out of hydro. And I think that is the lesson and certainly the message that needs to be taken to colleagues in the Congress, as well as to the new President and new administration.

Mrs. MCMORRIS RODGERS. OK.

Go ahead, Ms. Eden.

Ms. EDEN. Thank you, Madam Chair.

I agree with the numbers for load growth that are predicted by the gentlemen on either side of me.

The Power Council does a power plan every 5 years, and a new one is due out next year. The statute requires us to use cost-effective conservation first in the Northwest and then renewables, and then, as every other part of the country, we have built quite a bit of gas in the meantime.

We will be looking at all of the possibilities, including demand response and possibly hydro projects that have not yet been built.

Our fifth power plan, which came out in 2004, encouraged the upgrading of existing hydro projects, because there is a good deal of electricity that can be generated by investing the money necessary to upgrade those projects. Our last plan did not encourage the development of new hydro, at least in the Northwest, because it was determined that all of the sites were small, the potentials were small, and the cost was tremendous.

Ms. EDEN. So they weren't deemed to be economically feasible. As we do every 5 years, we will be looking at that question again.

Mrs. MCMORRIS RODGERS. Very good. Thank you. Madam Chairwoman.

Mrs. NAPOLITANO. Thank you, ma'am. I would like to ask to all panelists that some of the testimony focuses on the potential for new hydropower. And I know we have discussed it. And you have mentioned it may not be feasible in some areas. Developing a new—from different sources, do you think the House passed measure H.R. 6049 that includes a provision making some hydropower projects eligible for the production, tax credit and clean and renewable energy bond will incentivize new hydropower production if enacted? And is it enough to be able to entice or be able to enthuse people to get into the business of production? Yes, Mr. English.

Mr. ENGLISH. Clean renewable energy bonds is certainly a part of the renewable effort electrical operatives have underway. And we have some $60 million that we are applying along those lines with regard to the incremental hydro. So yes, the more we can get, the more we can engage and produce. And we think that that is very necessary. Could I add one additional point, Madam Chair, that there is something that I—also that I think people need to understand. Hydro is obviously the cheapest power we have in this country, and it makes more of a contribution to help keep electric bills down than anything else.

And these days, it is extremely important given energy prices. The point that I would make is that we are anticipating, because of the shortage and because of having a shift in natural gas, that

we are likely to see electric bills within this decade triple and maybe even more. And so hydro can play a major role in dampening that and helping to hold that down. So you know, even these small projects, they may not be cost effective now, but as those electric bills go up, they are going to become more cost effective and become more important as we try to hold down electric bills.

We project—and I will lay this out—we project that we will have a major shift as far as the realities of this country is facing. Up to this point it has been a national policy since the 1930s and the creation of the REA that electric power is affordable. We do not think that all of our citizens are going to be able to afford electric power in the not too distant future. It will be a shift that has been a result of national policy.

Mrs. NAPOLITANO. Thank you for your comments. That is something to look at. And back in the 1980s, when I was on city council, there was some discussion with our city manager in relation to utilizing the mains of the water—the water mains going through the cities that were, say, 8 to 12 inches, to be able to put some kind of a device to be able to create the energy. Has anybody even looked at an alternative way of developing that energy that may then not create the demand on the hydro—the grids, but be able to survive at least—not survive—promote and help the local residents be able to at least not have rolling blackouts? Anybody. Yes, ma'am.

Ms. EDEN. Thank you, Madam Chair. I will give you an example of the project, such as the one you might be referring to. In the Deschutes River Basin, which is just over the Cascades in Oregon, the irrigation districts and the Indian tribes and the irrigators have all gotten together and they are trying to do their best to save water and enhance everyone's business and everyone's way of life. One of the things they have done is to pipe irrigation canals so they are saving that water from evaporation. And they have put on at least one of those canals, on the new pressurized pipe, a hydro project. And I don't know exactly what the megawattage is of production.

But I was surprised to hear that they were doing that on pressurized pipe. I just heard about that this week and it is something that they are looking at there, so it must be something that irrigation districts and others are looking at, especially all over the west.

Mrs. NAPOLITANO. May I ask on behalf of this Subcommittee that any information that you have be forwarded? Because that is important for us to begin looking at other alternative methods. And I can tell you at the time that we were looking at in the City of Norwalk they projected they would be able to provide electricity to the whole of the city hall complex, which included about 8 or 10 buildings, including sheriffs and libraries and other buildings. So it could be something that might be locally available and assist in being able to provide that new energy.

Ms. EDEN. Madam Chair, I would be happy to provide that information.

Mrs. NAPOLITANO. I would appreciate that. Anybody else?

Mr. MORTON. Madam Chairwoman, in giving thought to your comments, we have always thought big, big, big in construction of our dams and our hydropower. I think there is a great value in

keeping in the picture a part of the whole puzzle, a part of the picture is the smaller operations. We have one on Sheep Creek. It is literally a creek. A family developed the power. This was 20 years ago. And have been very successful in selling it now to Avista. However, the regulations and the rules and the restrictions today would not permit them to be able to do that. They would not be permitted mainly because of the legal work involved and the many rules and regulations that really, as we see it, have not adversely impacted that stream of water. I think that is one thing we need to look at, too. Look at the turbines that can be used as the Scandinavian countries, the Netherlands, have done and we can benefit from their experiences.

Mrs. NAPOLITANO. Anybody else? Yes, Mr. Smith.

Mr. SMITH. Thank you, Madam Chair. And very briefly I guess, Commissioner Johnson, in speaking to the reliability of the grid and in referencing the blackout, the western electricity blackout in the 1990s and the chaos that it brought about, can you speak to how dams and hydropower could rise to the occasion for that?

Mr. JOHNSON. Because they have an ability to start up immediately, hydropower facilities do have an ability to get the grid back up when you have a blackout. Now, that ability has not historically been used. It hasn't had to be used. But it is there, and it is a very valuable resource to provide that startup when and if the need occurs. But in the blackout that we had back in the 1990s, actually the hydro facilities were not used in starting that backup and I don't think that there was a need. They were able to do it without it. But certainly it is a valuable resource from that perspective.

Mr. SMITH. OK. An the grid is capable of transmitting that power in a sufficient manner?

Mr. JOHNSON. I think in most cases, yes. But I am not—you know, I think that is probably a regional question that I don't have enough specific information to respond completely to.

Mr. SMITH. Thank you. On another topic I guess, Commissioner Johnson, you know, the current debate over climate change or, you know, that the weather is changing. Certainly, I think the evidence is in on that. As Mr. Costa suggested earlier, the debate is now how and why or what can we do to address that. But I think it is a good business decision affected by any entity affected by energy or—especially hydropower and global—and the climate change and the impact. How do you guys measure that at the agency? What do you do to kind of keep tabs on the effects of climate change?

Mr. JOHNSON. We have been paying a lot of attention to climate change. One of the problems that we have is there is not a lot of basin-specific data that really allows you to do a good analysis of how we ought to be looking at operating our facilities in the future, the very question that Congressman Costa was raising earlier. We know that it is getting warmer. We know we are going to have earlier run-off. How should that change our operations of our systems? But we don't have the specific data in terms of, what is the stream flow going to be, what is going to be the microclimate on a basin-by-basin basis. We have an initiative in our 2009 budget called Water For America.

Part of that initiative includes studies to try to get a better handle on that on a basin-by-basin basis. So we are hoping to get some

more resources into that area to try to get a better handle on how we should be operating our facilities in light of climate change.

Mr. SMITH. I appreciate that. And let me just say that as one who represents a great number of irrigators in the greater reclamation system, I mean, certainly the drought of the west has impacted things drastically, and I think it is just a good business decision to keep tabs on that. Thank you.

Mrs. NAPOLITANO. Mr. Costa.

Mr. COSTA. Thank you very much, Madam Chairwoman—both Madam Chairwomen. To follow up on Mr. Smith's line of questioning and my statement that I made earlier, we do know something though, Commissioner. I mean, we had droughts in California, the late 1980s and early 1990 until 1992 a 6-year drought. We have been in extended drought on the Colorado River, so based upon those dry conditions, we know how the systems have been operated during that time period. I am wondering if you can give us some more information based on that modeling. And one other factor, I don't know that you have been involved, but I know others have with the study of tree rings in the microbasins on the Sierra Nevada and with trees that go back 2,000 years old, they are still alive and we have been able to determine that based on the proximity of those tree rings to one another, dry periods versus extended wet periods of time over hundreds and—actually up to almost 2,000 years—which gives us some good record of precipitation.

And one of the things that I have been told is that what it really clearly indicates is that the last 90 years in California on the microbasins of the Sierra Nevada have been unusually wet compared to other periods of time during the hundreds of years cycles going back 1,000, 1,500 years. If that is the case, we have 38 million people in California. We are projected to have 50 million in the not too distant future, 2030, how are we going to make this water system work with the power?

Mr. JOHNSON. Well, we have done the kind of analysis that you are talking about from a tree ring perspective. We have done quite a bit of study, particularly on the Colorado River Basin, to correlate tree rings with stream flow. And we have re-created a 500-year record on the Colorado River system that does give you the chance to look at extended periods of drought and how that would affect our operations on that system. And in fact, that information was included in the recent development of our shortage guidelines that we put in place on the Colorado River system just this last year.

Mr. COSTA. So we can, based upon that, determine how much reduced power that we will lose as a result of drought conditions?

Mr. JOHNSON. Well, we can look at periods of the record that occurred in the past that were significantly dry. And we can say if that kind of drought condition might occur again——

Mr. COSTA. We will lose so much power?

Mr. JOHNSON. Absolutely. We can look and see. We are going to lose a lot of power.

Mr. COSTA. Before my time expires though, some of the things we have done—and I wonder how well you have inventoried it that maybe raises less political opposition, i.e., raising spillway gates on reservoirs that add the capacity, you add the capacity that provides more water, whether it be for generation of electricity or for other

purposes. Have you inventoried all those significant reservoirs, whether they be Bureau or in partnership with the Army Corps or projects that are owned by other entities that have hydro facilities on them that had the potential to raise gates?

Mr. JOHNSON. Yeah. There was an Energy Policy Act that was passed about 2 years ago that required all Federal agencies to review power resources, hydroelectric facilities. And, in fact, I think there was a report that was provided to Congress that identified areas where—opportunities for more hydro development. Yes, sir.

Mr. COSTA. And how much additional power does it say we could realize?

Mr. JOHNSON. We identified some in Bureau of Reclamation facilities. And I couldn't tell you off the top of my head but it is not a lot. To be real honest with you, there was not a lot.

Mr. COSTA. The Kiowa Reservoir in the late 1990s, the legislation I carried on the State level, and Caldula carried at the Federal level, added 48,000 acre feet of storage capacity to that reservoir.

Small hydro, quickly, any of you have any idea of what small hydro can add to our renewable hydro source? No estimates?

Mr. GRUENSPECHT. I know there are some projects—some of them are very preliminary—before the FERC. There is more of this hydro kinetic, which is the tidal, the instream, and the wave as well. And they are looking at about—I think now—some of this is prefiling but there is about six gigawatts, I would say.

Mr. COSTA. Didn't you say in your testimony about tidal—you mentioned the tidal potential?

Mr. GRUENSPECHT. No, I did not. I said we don't include it in our model to be clear because in our reference, we have a modest, very modest amount of additional conventional hydro added, and I think that was consistent with much of the others in the panel. But I wanted to make it clear that that was the conventional hydro, and this unconventional hydro, again, has some potential, but it is very early days and it is very hard to define exactly what that is.

Mr. COSTA. My time has expired. I thank both of you.

Mrs. NAPOLITANO. Thank you, everyone. That will conclude the first panel. We may submit some questions to you in writing and we would just ask that you respond as promptly as possible. Before the next panel is recognized, I wanted to ask unanimous consent that statements from the Navajo Tribal Utility Authority and the American Public Power Association be included in the record.

[NOTE: The statements submitted for the record have been retained in the Committee's official files.]

Mrs. NAPOLITANO. And I think before the next panel comes up—those of you on panel 2, maybe you can start making your way to the table. I wanted to show the committee a 2-minute clip of a Today Show piece on hydropower that I thought you would enjoy.

[Video is played.]

Mrs. NAPOLITANO. Thank you, Madam Ranking Member. It is very good to see something that we don't normally all get to visit. For our second panel, we have Mr. Scott Corwin, Executive Director of the Public Power Council from Portland, Oregon. Mr. Richard Roos-Collins, Director of Legal Service for the National Heritage Institute of San Francisco. He also serves as Chairman of the Board for the Low Impact Hydropower Institute and General Coun-

sel for the Hydropower Reform Coalition. Also we have with us Mr. Bruce Howard, Director for Environmental Affairs for Avista Utilities from Spokane, Washington. And finally, Mr. Tim Culbertson, General Manager of the Grant County Public Utility District from Ephrata, Washington. Did I pronounce that right?

Mr. CULBERTSON. That is good.

Mrs. NAPOLITANO. Welcome to the witnesses. And we will start off with Mr. Corwin. Your testimony, sir.

STATEMENT OF SCOTT CORWIN, EXECUTIVE DIRECTOR, PUBLIC POWER COUNCIL, PORTLAND, OREGON

Mr. CORWIN. Great. Good afternoon, Chairwoman Napolitano, Ranking Member McMorris Rodgers, members of the committee. I am Scott Corwin, Executive Director of the Public Power Council, representing the consumer-owned utilities of the northwest who purchase power from the Federal Columbia River power system. They serve parts of seven States and serve 41 percent of the consumers in the region. I appreciate you holding this hearing today. Thank you very much for having this hearing and also for showing that media clip. That was well done and right on point. It actually displayed a lot of the points I am going to make.

You have my written testimony for the record. So I am just going to quickly point on three points here, and I will focus on the Federal side. But I would agree with much of the testimony that I know both Tim Culbertson and Bruce Howard are going to present on the non-Federal side as well. Excuse me. I have a cough that is a constant condition of having three children under 7. So I apologize for that.

But my first point is, it really is, as you saw partly in that video, it is really difficult to overstate how critical this issue is. Not just to the northwest but nationally. I know Ranking Member McMorris Rodgers understands this very well and represents us in the northwest very well in this respect. But the benefits of this hydropower system and the Columbia Snake River system are extensive because it is the fabric of our economy there in the region. And it is not a partisan matter. It is just a fact. It is renewable low-cost very reliable, very flexible power, and it is able to facilitate the newer renewables very well, as others have mentioned. But it is integrated also with much of the rest of the economy, including certainly on the irrigation side, the farming side, food processing, barge transportation, 40 million tons worth moving down this system. A friend reminded me as we were talking about this hearing to mention how this does function as a system. So we have especially, on the Federal side, but actually the whole system we have agreements to coordinate the hydropower and the transmission system, including with Canada. And this creates quite an amazing engine for the region.

Northwesterners realize the value of this renewable power. In fact, we did some polling with a group called Northwest River Partners that showed very clearly that most citizens in the northwest view hydropower as renewable similar to solar and wind. This brings me to my second point about this system. It is a flexible system with storage capability. But it is not just a system for the northwest. In the 1960s and 1970s, and the video showed this very

well, we had the foresight to build large transmission lines, 500 kilovolt lines south to California in the desert southwest.

So we are connected in a real sense. In the summer, power moves south for cooling. In the winter power moves north for heating. And that works very well and that is a key to the western economy. It also works well in times of crisis. And I guess I would have an answer that differs slightly from Mr. Johnson's question on the first panel. I think the hydropower system has been critical in times of energy crisis to avoid even worse crises because in part of the storage capability there, not to mention the fact that the generators themselves are very reliable. And in fact, on the Federal system, they have a forced outage rate of about 3 percent. So it is a very reliable system and very useful in many respects to avoid problems with generation.

And that brings me to my third point on emissions, just to finish up. I think the benefits to hydro are worldwide, but they are definitely west wide. And I would just point to you a couple of charts that I have on page 4 of my testimony that show that when you have better hydro years, in figure A, you have lower emissions and vice versa. You also, as Representative McMorris pointed out very well, would have much increased CO2 production if you take out generation, such as some had proposed on the Snake River.

So this is a safe, reliable, low-cost resource. It is a proven technology and it is too valuable to neglect or degrade in light of the great challenges facing us moving for. Again, thank you very much for your leadership and holding this hearing today.

Mrs. NAPOLITANO. Thank you, sir. I couldn't agree with you more.

[The prepared statement of Mr. Corwin follows:]

Statement of R. Scott Corwin, Executive Director, Public Power Council

Greetings Chairwoman Napolitano, Ranking Member McMorris Rodgers, and Members of the Sub-Committee. I thank you for the opportunity to testify today on this important topic.

The Public Power Council (PPC) is a trade association representing the consumer-owned utilities of the Pacific Northwest with statutory rights to purchase power from the Federal Columbia River Power System. Member utilities have service territories in portions of seven western states and serve over 41% of the electricity consumers in the region. We are committed not only to preserving the value of the Columbia River system in terms of its clean and reliable electricity for consumers, but also to furthering the trust responsibilities and stewardship goals we all share within the region.

Hydropower and Energy Policy

We appreciate your initiative in raising the issue before us. Hydropower has played, and will continue to play, an incredibly important role in our nation's energy policy. As I will describe, hydropower is a renewable resource with numerous beneficial aspects including its lack of emission of gases and its status as being uniquely well-suited to facilitating other renewable resources. The irony is that many current policy proposals disadvantage hydropower or would penalize regions like the Northwest where we already have made enormous investments not only in hydropower and other renewable generation, but also in energy conservation. In fact, since we started keeping track with the Northwest Power Act in 1980, the Northwest has achieved 3,700 average megawatts of energy-efficiency, enough electricity to serve the entire state of Idaho and portions of Montana.

Despite these good efforts, increasing demand for electricity in the Northwest will continue to outpace the addition of new conservation or other renewable resources. Therefore, it is very possible that constraints on hydropower could have the effect of pushing the region more quickly toward higher-cost, higher-emitting sources of

generation. The economic impacts of this direction are of great concern in light of the possibility of new policies regarding carbon emissions.

The Role of Hydropower in the West

Hydropower is the original renewable source of power beginning with the waterwheel used to grind corn in ancient times. In many areas of the country, hydropower is a major driver of economic vitality. In the Northwest, it has been nothing less than the lifeblood of the region throughout modern history. The dams lend not only a clean, continuing supply of power, they are critical to transportation, irrigation, flood control, and recreation as well. Barging on the Columbia River moves 40 million tons of goods each year and keeps hundreds of thousands of trucks and their associated emissions off of the road. According to the Pacific Northwest Waterways Association, the Columbia and Snake River Basin is the number one transportation gateway nationally for wheat, barley and several other commodities.

To an area that was still largely without electricity in the early 20th century, the dams brought light and then hope of economic vitalization coming out of the great depression. Construction on the larger projects, such as Bonneville and Grand Coulee Dam began in 1933. But, long before that hydropower was beginning to make its mark in the Northwest, including the first "long distance" transmission of electricity 14 miles from Willamette Falls to the streetlights of Portland in 1889.

In the Federal Columbia River Power System (FCRPS) there are now 31 dams ranging from a three megawatt diversion dam in Boise, Idaho, to the 6795 megawatt Grand Coulee Dam in Washington (See Appendix 1). Total peak capacity of the resources marketed by the Bonneville Power Administration (BPA) totals 13,934 megawatts, and almost 90% of that is hydropower. In the entire Northwest region, there is about 41,500 megawatts of capacity with close to 60% of it in hydropower.

The Benefits of Hydropower as a Renewable Resource

Even though hydropower may fluctuate year to year, month to month, or week to week, it is stable and flexible within short periods of time. It has very important positive characteristics in addition to deriving its source of energy from continuously renewable water: (1) It is efficient in its conversion of energy; (2) It is clean in that it does not have waste heat or external emissions; (3) It is reliable since it makes use of basic and time-tested technology; (4) It is domestic to the United States; (5) It is generally low-cost; and, (6) it is flexible in that it can adjust quickly to changes in demand.

Ratepayers of the Northwest receive the benefit of this resource and they pay for all of the costs of this system. Electricity ratepayers pay for all of the operations, maintenance, and capital of the system. And, they are cognizant of the great benefit hydropower lends from an environmental perspective. In fact, polling conducted last year on behalf of Northwest RiverPartners (www.nwriverpartners.org) showed that 86% of respondents view hydro as a renewable resource similar to wind or solar. And, hydro far out-ranked other sources when respondents were asked which of the various sources of energy within the region is the most practical to rely upon.

In the context of the current search for new non-emitting energy sources, the reliability and flexibility of hydropower make it particularly well-suited to integrating other renewable sources of energy, such as wind, that are much more intermittent. The system operated by BPA currently is integrating a total of over 1400 megawatts of wind generation. This 1400 megawatts is expected to double in the next few years, and could double again after that to approach 6000 megawatts according to current projections. Because of the variable nature of wind production, pairing it with hydropower is an effective method of creating a more reliable power supply.

Hydropower and Emissions

Because of the 31 dams and the nuclear plant in Washington that is also part of the federal system, customers of BPA have some of the cleanest power anywhere from an emissions perspective. With hydropower as 80.7% of the firm energy used by most customers of BPA, and nuclear adding another 12%, the portfolios of many of our member utilities are over 92% emissions free.

On the next page are two charts demonstrating a key aspect of hydropower with respect to emissions—it has none. I would like to commend those on the Northwest Power and Conservation Council (NWPCC) for taking on the task of studying the impacts of this dynamic last year. The NWPCC is an unbiased interstate compact created by the Northwest Power Act in 1980 to advise the region on power, conservation, and fish and wildlife issues. They found that, while the Northwest has much smaller CO2 output than other regions, its CO2 production from electricity will grow 20% over the next 20 years to over 70 million tons annually, even if we meet fairly aggressive targets for conservation and new renewable generation. This is because most of the resources realistically available for the current planning

horizon are coal and natural gas fired generation. Figure A on the next page shows how CO2 emissions are inversely proportional to hydropower production in the Northwest: the better the water year, the lower the emissions.

In addition, the NWPCC found that breaching the four lower snake dams, as some have proposed for salmon, would significantly exacerbate the issue by adding 4.6 million tons of CO2 annually within the Northwest, and 5.2 million tons annually across the entire West-wide system (See Figure B, next page). Also, in light of success with other passage methods, we have questioned the efficacy and efficiency of some of the extremely expensive spill operations on the federal system where water that could produce power is flushed downstream in an attempt to pass juvenile fish over the spillways. The choices and opportunity costs are even more poignant when one recognizes, as the NWPCC showed, that current spills send five million tons of CO2 into the air as replacement power is generated for what would otherwise be electricity from hydropower. The entire report can be viewed online at http://www.nwcouncil.org/library/2007/2007-15.htm

Figure A. Historical CO2 and Energy Production of Northwest Power System
Source: Northwest Power and Conservation Council Doc 2007-15

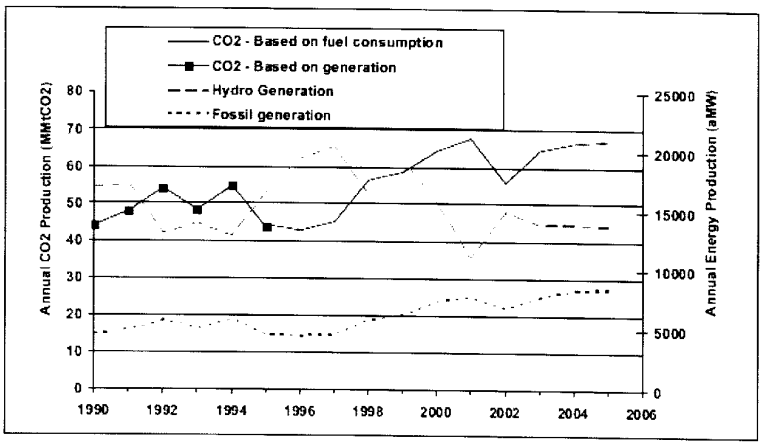
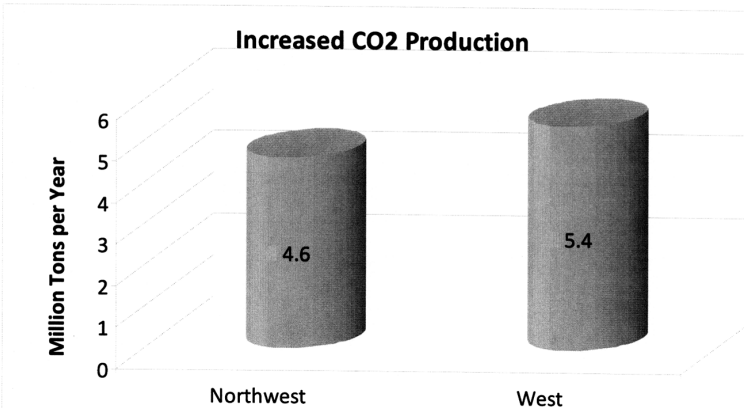


Figure B. Estimate of CO2 Impacts if Four Lower Snake River Dams Removed
Source: Northwest Power and Conservation Council Doc 2007-15



Hydropower in the Future

Last summer the Electric Power Research Institute estimated that the potential increase in hydropower generation nationally could be 23,000 MW by 2025, and as much as four times that remains undeveloped. In the Northwest, we will be looking for opportunities wherever possible. Some of those efforts may involve projects on a very small scale such as irrigation drops. Some are needed enhancements at the larger projects.

Part of the challenge is maintaining the system we have. Over the next two decades, total annual operations and maintenance costs to ratepayers for the FCRPS hydro program are expected to increase from just under $250 million annually, to over $350 million per year. Adding annual capital costs doubles this amount. Grand Coulee was mentioned earlier in this hearing. Operations and maintenance at that single project cost over $60 million per year. Because hydropower projects experience these costs regardless of how much output they provide, we have a serious interest in ensuring that their operations are not constrained for non-power reasons unless absolutely necessary.

Challenges for Hydropower

A challenge for hydropower in the near future comes from the increasing demand for electricity combined with the natural and regulatory limitations on generation. In other words, there is a limit to the available capacity of the system, and therefore a limit to the demands that can be placed on the system regardless of whether those demands are for fish and wildlife, integrating wind or other intermittent resources, or following customers' loads placed on the system. Work is underway in the region to better identify the available capacity on an hour by hour basis throughout the year.

So far, I have focused mostly on the positive aspects of hydropower because they are numerous. But, in the Northwest, we are also very aware of its impacts to the environment because we have made enormous commitments of time and money to address these issues.

Treaties with tribal governments and statutes such as the Northwest Power Act and the Endangered Species Act play major roles in how we manage the hydropower system for salmon and steelhead in the Northwest. In fact, the federal agencies overseeing the FCRPS just signed memoranda of agreement with several tribes and states in the Northwest assuring over $900 million in funding for projects in order to address fish and wildlife needs over the next 10 years. At the same time, these agencies released a new biological opinion under the Endangered Species Act that represents an enormous collaborative scientific effort. This biological opinion came with another set of costs and operational constraints on the system.

Operational constraints on federal Columbia River hydropower, such as spilling water over the dams or adjusting the timing of flows in the river, have reduced the average generation of the system by about 1000 average megawatts of energy, or about 13%, since 1995. According to BPA, the fish and wildlife cost category will account for about 30 percent of the rates charged to customers for the upcoming rate period, or about $800 million per year. The ratepayer cost for fish and wildlife mitigation, just in the federal hydropower system, totaled $9.3 billion from 1978-2007.

At the same time, fish passage through the projects has been good and is improving all the time. Adult passage using ladders has been excellent for many years. And, new technology is seeing juvenile fish passage downstream at very high rates. In fact, the new biological opinion sets a very high, but achievable, targets for juvenile passage at each dam of 96% in the spring and 93% in the summer.

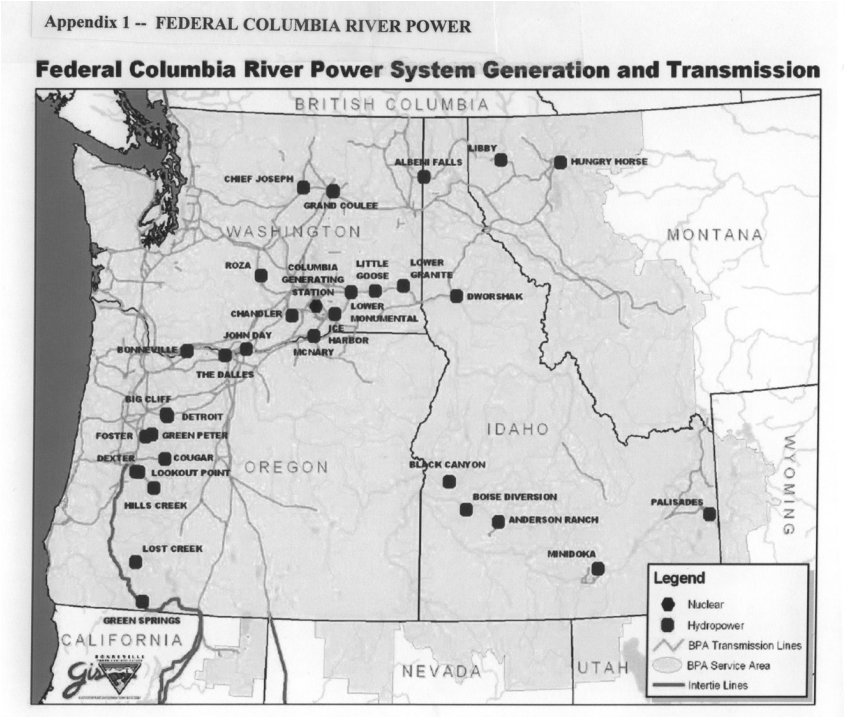
It is useful to remember that hydropower is only one of many factors impacting species. Historically, the impacts of over-fishing, poor hatchery practices, habitat degradation, and naturally occurring ocean conditions have been major contributors to the status of salmon and steelhead stocks. Any approach to salmon recovery that will be successful long-term must take into account all aspects of the salmon lifecycle including impacts from hydro, hatcheries, harvest, and habitat.

Conclusion

In light of its significant benefits to customers and to the environment as a clean, renewable, and flexible form of generation, hydropower should be preserved, encouraged, and enhanced where possible. Over the last 70 years of major hydropower production in the Pacific Northwest, citizens of our region and neighboring regions have benefited from this resource and its clean energy, low impact transportation, irrigation, flood control, and recreation.

At a critical time in our nation's history with respect to energy policy, hydropower is positioned to take a lead role if our state and federal policies allow it to do so. As a safe, reliable, and low-cost resource that has the means to enable other renew-

able generation, this proven technology is too valuable to ignore in light of the challenges facing us in the days and years to come. Again, thank you for your leadership in holding this oversight hearing today.



Mrs. NAPOLITANO. Mr. Roos-Collins.

STATEMENT OF RICHARD ROOS-COLLINS, DIRECTOR, LEGAL SERVICES, NATIONAL HERITAGE INSTITUTE, SAN FRANCISCO

Mr. ROOS-COLLINS. Madam Chairwoman, Ranking Member McMorris Rodgers, other Members, thank you so much for holding this hearing and also for this opportunity to testify. I have four points. The first is that non-Federal hydropower provides multiple benefits: Power generation, water supply, flood control, water quality protection, fish and wildlife enhancement. Indeed your predecessors and FDR 73 years ago enacted the Federal Power Act, which requires that each project must be best adapted to a comprehensive plan of development of the affected waters for all of these beneficial uses.

Now since 1986, many of the projects that were built way back when have been relicensed. In the course of those decisions, the power generation has—98 percent of the power generation has been preserved. The generation capacity has actually increased by 4 percent. And in addition, the projects now provide substantially greater benefits for fish and wildlife and recreation and water supply and flood control for the benefit of all of the affected communities. Indeed, most of these new licenses are based on settlements. In part, because the Hydropower Reform Coalition, whose Execu-

tive Director is here and the National Hydropower Association, whose Executive Director is also here, have advocated to our respective members that settlements are preferable to litigation as the basis for these relicensing decisions.

Now, a few of these projects have been decommissioned, but they have been decommissioned only where the utilities or the merchant generators who own them concluded that it is in their interest as well as the public interest to decommission them. My second point goes to Federal projects. Congress, of course, authorizes Federal projects directly. They have what amount to perpetual licenses. Nonetheless, every Federal operator has authority to re-examine its plan of operation, or the rules which guide its operations at each project.

Unfortunately due to budget and staff constraints, the plans for many of these projects are literally decades old. This Subcommittee should encourage all Federal operators to look at their plans of operation, and I mean, every one of them, in order to optimize the power generation and other benefits which these projects could provide. And indeed that would be an excellent opportunity to look at climate change. Now, to answer Congressman Costa's question, in California, the Department of Water Resources has now looked at climate change sufficiently to predict the range of impacts on water supply operations. The best case involves substantially greater risk of spills from our storage dams. And the worse case is much worse. We now have the knowledge in California—and I believe in other States—to begin integrating climate change, whatever causes it, into the operational decisions for Federal and non-Federal hydropower alike.

My third point goes to retrofitting of existing projects, whether Federal or non-Federal. In answer to another question, I believe that existing projects are existing capital stock, should be retrofitted where that can be done in a manner that provides enhanced benefits, power generation, water supply, recreation, fish and wildlife protection. Indeed the Low Impact Hydropower Institute, which is a voluntary enterprise established by the conservation community, has now certified more than 2,000 megawatts of capacity in this country, some of it incremental hydropower redevelopment precisely for that reason so as to provide market benefits for retrofits.

And in turn, we helped sponsor the legislation, Madam Chairwoman, that you referenced, H.R. 6049 and support production tax credits for retrofits. And as for opportunities at the Federal projects, again, I believe that if the Federal operators examine their plans of operation, they could find opportunities for retrofits and bring those back to this Congress for funding.

My last point goes to new development. Hydrokinetic or damless technology has substantial promise, whether in the East River, the Wright project that was mentioned earlier, or in estuaries or even in the ocean. At this point we don't know how real that promise is. What we need to do is test it by actually having pilots built and then monitoring them carefully and adapting to see how well they perform to providing the benefit of power generation while also protecting the local ecosystem. And yes, Madam Chairwoman, I agree that canals and other pressurized facilities should be examined for

retrofits as well to install these turbines so as to extract the maximum value from the water that is delivered for other purposes.

In sum, I believe that time is of the essence for us to improve our hydropower policy so that hydropower continues to provide the multiple benefits it does today. Thank you.

Mrs. NAPOLITANO. Thank you for your testimony. And it is really very much in tune with what we are hoping to find as different assistance to be able to address global warming, climate change, whatever you want to call it. And the increasing demands. And also help the power groups be able to do their job.

[The prepared statement of Mr. Roos-Collins follows:]

Statement of Richard Roos-Collins, Director of Legal Services, Natural Heritage Institute

Chairwoman Napolitano, Ranking Member McMorris Rodgers, and Members of the Subcommittee, thank you for this the opportunity to testify on the present and future of hydropower.

I am Richard Roos-Collins. I am the Director of Legal Services for the Natural Heritage Institute (San Francisco), a public interest law firm which represents conservation groups and public agencies in efforts to resolve complex energy and water disputes for public benefit. I am Chairman of the Board of the Low Impact Hydropower Institute (Portland, ME), which certifies non-federal hydropower projects so as to provide market rewards for their exceeding regulatory requirements for environmental protection. And I am General Counsel to the Hydropower Reform Coalition (Washington, D.C.), a nationwide association of 140 groups (representing more than 1 million members) interested in the relicensing of non-federal hydropower projects to restore environmental quality consistent with reliable electricity generation.

Hydropower today provides an average of 96,000 megawatts of generation capacity. This consists of 42,000 megawatts at federal projects, and 54,000 megawatts owned and operated by non-federal licensees regulated by the Federal Energy Regulatory Commission (FERC). All told, hydropower is roughly 75% of all generation capacity which the DOE Energy Information Administration categorizes as renewable.

Hydropower capacity has not changed significantly in the past two decades. This oversight hearing allows us to focus on the future. Should hydropower capacity be increased as a deliberate strategy to meet growth in electricity demand and mitigate the climate change impacts of non-renewable generation?

My answer is: yes, done in a manner which will protect and enhance other beneficial uses of the affected waters. Rivers, estuaries and the oceans are public commons which have many beneficial uses. These include water supply, flood control, recreation, and fish and wildlife in addition to electricity generation. In the Federal Power Act of 1935, Congress required that each non-federal project must be best adapted to a comprehensive plan of development for all such beneficial uses. That bedrock principle is as vital today as 73 years ago. The laws authorizing federal hydropower projects contain similar requirements. I will discuss the future of federal hydropower by first reporting lessons recently learned in non-federal hydropower.

Since the enactment of the Electric Consumers Protection Act (ECPA) in 1986, FERC has relicensed more than three hundred non-federal hydropower projects. As required by the 1935 Federal Power Act and ECPA, each new license must comply with current laws, including the Endangered Species Act and Clean Water Act. According to FERC's Comprehensive Review and Recommendations Pursuant to Section 603 of the Energy Policy Act of 2000 (2001), the new licenses reduced the historical generation at these projects by 1.6% while increasing capacity by 4.1%. These changes resulted from new flow regulation conditions to enhance fisheries, recreation, and other non-developmental uses. These enhancements provide substantial economic benefits for local communities. FERC concluded that these new licenses are better adapted than the original licenses to comprehensive plans of development of the affected waters.

Most new licenses for non-federal hydropower are now based on settlements. In such a settlement, the licensee, regulatory agencies and conservation groups, and other local stakeholders resolve their disputes about the project and commit to cooperate in the implementation of environmental conditions over the term of the new license. FERC will approve such a settlement upon concluding that it meets the legal requirements for a new license. As recently as a decade ago, relicensing deci-

sions were almost always contested and litigated. This sea change occurred because the non-federal hydropower industry (represented by National Hydropower Association), the conservation community (represented by the Hydropower Reform Coalition (www.hydroreform.org)), and other stakeholders agreed to support and implement policy reforms under existing laws to encourage such settlements. To its credit, FERC adopted the Alternative Licensing Process (1997) and the Integrated Licensing Process (2003), which do just that. This policy change is driven by the recognition that a settlement establishes a joint commitment to the future of the project—not only compliance with license conditions, but also adaptation to changed circumstances over the 30-50 year term of the license.

Recent market reforms promise to improve the future of non-federal hydropower. Since 2001, the Low Impact Hydropower Institute (LIHI) (www.lowimpacthydro.org) has offered certification to any project owner who voluntarily applies and demonstrates compliance with performance standards which exceed minimum regulatory requirements for environmental protection. The certification may then be used to secure premium rates in retail markets which permit such consumer choice. LIHI has now certified 2,043 megawatts of non-federal hydropower. This is the only such program in the nation. Its future is bright. LIHI has more pending applications than at any time in its history. Project owners increasingly recognize that this certification program provides retail market rewards for their efforts to reduce their environmental impacts consistent with reliable electricity generation.

As another important example of market reform, the National Hydropower Association, the Hydropower Reform Coalition, and the Union of Concerned Scientists recently proposed legislative language, included in the energy bill (H.R. 6049) passed by the House last month, to provide production tax credits to retrofit existing dams to expand or add generation capacity. While a technical reform in tax law, this demonstrates how the industry and conservation community may effectively collaborate in legislation, when needed to enhance the public benefits of hydropower.

So what do these developments in non-federal hydropower suggest for the federal hydropower which is under this Subcommittee's direct jurisdiction?

Federal operators should examine possible modifications to their plans of operation and even the design of their hydropower projects. Each project has such a plan, initially adopted during or just after construction to state the rules of operation. A typical plan is many decades old. Federal projects are not subject to a fixed term as with non-federal hydropower, and budget constraints have limited the willingness of federal operators to reopen their plans. Nonetheless, existing laws permit and even require the Army Corps of Engineers, Bureau of Reclamation, and other federal operators to periodically examine possible modifications to the plans of operation for all projects they administer. Such review will improve electricity generation—operationally or by justifying physical retrofit of the generation capacity. It will enhance other public benefits, including water supply, navigation, and environmental protection. A federal operator often has authority to implement such modifications in operations or even physical design, subject to reporting to Congress. Such review includes public participation and may also result in better understanding and even support by local stakeholders for the future operations of a federal project. In 2002, the Army Corps entered into a Memorandum of Understanding with The Nature Conservancy (www.nature.org/initiatives/freshwater/partnership/) to examine plans of operation at several pilot projects. This Subcommittee should encourage federal operators to systematically use existing authorities to optimize their project operations for all public benefits.

Federal operators should consider how to adapt to climate change when they review their plans. Climate change will significantly affect local hydrology—the timing, volume, and temperature of flows—in all regions of our nation. This will alter electricity generation, water supply, and other purposes of federal projects. It will cause significant stress to anadromous fisheries and other aquatic species. Federal operators should systematically examine alternatives to optimize future performance of their projects in the face of such change. An example which Natural Heritage Institute (www.n-h-i.org) is pursuing in California and elsewhere in the West is diversion into storage of the increased flood flows likely to result from climate change, where the storage will not be behind the federal project but instead in a downstream groundwater aquifer or floodplain.

This hearing topic also asks the question: leaving aside existing projects, what is the prospect for new hydropower development? Over the course of many decades, general surveys have shown undeveloped physical potential for such development. However, those surveys are predictions. They do not give due weight to other variables for a given site, including the likely return on investment, the capacity of the local transmission system, foreseeable impacts on other beneficial uses of the af-

fected waters, legal requirements, or the views of local stakeholders. Actual development of new hydropower will turn on the ability of a sponsor to manage all of these variables and produce net public benefits including but not limited to the new generation capacity.

For example, non-federal developers are exploring the potential for hydrokinetic (or damless) development in our estuaries and oceans. Although no commercial project exists in those waters today, more than a hundred sites are under active investigation. The National Hydropower Association and Hydropower Reform Coalition are again exploring possible policy reforms under existing laws to permit new development consistent with protection of the marine environment. I offer my thanks to the Natural Resources Committee for your substantial attention to ocean energy in the reauthorization bill for the Coastal Zone Management Act. In my view, this hydrokinetic technology will mature rapidly as we find the right pilot sites, learn how to efficiently apply and complete the regulatory process in this largely unknown marine environment, and then adapt both operations and design following construction.

In sum, the future of hydropower depends fundamentally on the continued willingness of the non-federal licensees and federal operators to generate electricity in a manner which protects and enhances other beneficial uses of the affected waters. In political terms, I mean simply that the industry, conservation community, and other stakeholders should work together, and systematically, to create that common future.

Thank you for considering this testimony.

Mrs. NAPOLITANO. Mr. Howard.

STATEMENT OF BRUCE HOWARD, DIRECTOR, ENVIRONMENTAL AFFAIRS, AVISTA UTILITIES, SPOKANE, WASHINGTON

Mr. HOWARD. Thank you. Chairwoman Napolitano and Ranking Member McMorris Rodgers, I am Bruce Howard, Director of Environmental affairs for Avista Corporation. Thank you for the opportunity to testify. Avista is an investor-owned utility headquartered in Spokane, Washington, that provides electric and natural gas service to approximately 480,000 customers in eastern Washington, northern Idaho and Oregon. Our service territory includes much of Congresswoman McMorris Rodgers's district.

We are greatly appreciative of her champion work on behalf of hydropower and the communities we serve. Hydropower is Avista's largest electric resource, comprising over half our generating capacity. Our hydropower resources are licensed by the Federal Energy Regulatory Commission and include the 788 megawatt Clark Fork Project in Montana and Idaho, as well as the 154 megawatt Spokane River Project in Washington and Idaho. We also own the 50 megawatt Kettle Falls biomass generation station in Kettle Falls Washington, which is fueled by wood waste.

We recently announced the planned development of a wind generation facility also in Congresswoman McMorris Rodgers' district. Our investments in renewable energy, along with our leading demand side management programs, make Avista's carbon footprint very low in comparison to other electric utilities throughout the United States.

Hydropower provides extensive economic environmental and reliability benefits. It is the largest single renewable electric resource in the United States, providing approximately 9 percent of total U.S. summer capacity. Hydropower is emission free, especially significant at a time in which we are seeking to reduce greenhouse gas emissions. In addition, the hydropower industry has actively

addressed environmental concerns, as we have just heard, through their licensing process and other regulatory processes and by employing innovative technologies. Hydropower also enhances the reliability of electric system. In addition to being a highly reliable power source in its own right, hydropower firms other intermittent renewable resources such as wind and solar power. And we know that hydropower will be called upon more and more in the future to enable these alternative resources.

The conventional wisdom is that hydropower has little growth potential in the future. This isn't the case. While the opportunities for building large new conventional hydropower projects are limited, there is significant potential to add capacity at existing facilities through upgrades as well as through the addition of pump storage facilities. Pump storage facilities take advantage of demand and cost differentials to, in effect, store energy. There are also opportunities to incorporate electrical generation at nonpower dams as well as for entirely new small hydropower facilities. Moreover, substantial new hydropower resources are available through innovative hydrokinetic technologies that will tap the energy of river tidal and ocean currents. FERC statistics indicate active license applications for over 1,300 megawatts of new conventional and pump storage hydropower and over 3,200 megawatts of additional capacity are in the prefiling stage at FERC.

More than 6,000 additional megawatts of hydrokinetic capacity are also in the prefiling stage. While not all projects in the prefiling stage at the FERC will mature into applications, these figures demonstrate the tremendous interest in new hydropower development. For Avista, the most important thing Congress can do at this time is to secure long-term extension and expansion of the production tax credit for incremental hydropower that was enacted by Congress as part of the Energy Policy Act of 2005. Based in part on obtaining PTC half credits of .9 cents per kilowatt hour, Avista embarked on a series of upgrades to its existing hydropower dams, adding 7 megawatts of capacity to date with approximately 36 more megawatts available for further upgrades. Because of the long lead time associated with replacing turbines, it is essential that Congress renew the PTC for an extended period along with the counterpart CREB program that supports renewable investments by municipal and cooperative utilities. Avista also strongly supports the agreement recently reached by the NHA and environmental groups to support the expansion and application of the PTC and CREB program to the development of power at dams that currently do not generate electricity. Climate change legislation may well become the biggest policy driver impacting future energy investments including investment decisions regarding hydropower. It is important that these investments made be rewarded rather than penalized in any cap and trade legislation adopted by Congress.

Therefore, Avista urges Congress to allocate any admission standard allowances to utilities based on their electricity output or load served not based on historic greenhouse gas emissions. Finally, Federal support for hydropower research and development has been relatively minimal for many years. Robust R&D developments and hydropower are essential if we are to tap the full poten-

tial of innovative hydropower solutions. Avista strongly supports NHA's efforts to expand this funding.

In closing, Avista deeply appreciates this opportunity to testify and commends the Subcommittee for its leadership on the important issue of the contribution of hydropower to our Nation's energy future.

Mrs. NAPOLITANO. Thank you Mr. Howard. And I am hoping the Senate does keep that provision, does not delete it so that you do have some support on that bill.

[The prepared statement of Mr. Howard follows:]

Statement of Bruce Howard, Director, Environmental Affairs, Avista Corporation

I. INTRODUCTION

Chairwoman Napolitano, Ranking Member McMorris-Rodgers and members of the Subcommittee, I am Bruce Howard, the Director of Environmental Affairs for Avista Corporation. Avista appreciates the opportunity to testify, and commends the Subcommittee for holding this hearing on the critical role of hydropower as a renewable resource.

Avista is an investor-owned utility headquartered in Spokane, Washington, that provides electric and/or natural gas service to approximately 480,000 customers in eastern Washington, Northern Idaho, and Oregon. Hydropower is Avista's largest power resource, comprising approximately 52% of our electric generating capacity.

Our hydropower resources are licensed by the Federal Energy Regulatory Commission (FERC), and include the 788 megawatt (MW) Cabinet Gorge-Noxon Rapids Project in Montana and Idaho (also known as the Clark Fork Project), and the 154 MW Spokane River Project in Washington and Idaho. We also own the 50 MW Kettle Falls biomass generation station in Kettle Falls, Washington, which is fueled by wood waste. Our investments in renewable hydropower and biomass, along with our highly efficient natural gas generation and energy efficiency, conservation, and other demand side management programs, make Avista's "carbon footprint" very low in comparison to most electric utilities in the United States.

II. THE MANY BENEFITS OF THE RENEWABLE HYDROPOWER RESOURCE

Hydropower provides extensive economic, environmental and reliability benefits. It is the largest renewable electric resource in the U.S., providing approximately nine percent of U.S. total summer capacity. Hydropower is emission-free, a very significant environmental benefit in an era in which we are seeking to reduce greenhouse gas emissions to slow global climate change. In addition, any adverse environmental impacts of hydropower on aquatic resources have been substantially reduced or eliminated through the relicensing process, new and innovative technology, and the application of key environmental laws.

To give just one example, the collaborative alternative licensing process used by Avista for the relicensing of the Clark Fork Project in Montana and Idaho resulted in a "win-win" settlement with all key agencies and stakeholders. For example, to implement the project's new license, over 2,600 acres of key bull trout habitat have been acquired, protected, and restored, and six miles of stream habitat have been recreated or restored. The settlement and new license, which was approved by the FERC in 2000, provide major environmental enhancements and, at the same time, preserve the economic benefits of the Project. In addition, this Project, like many others, provides unique recreational and other community benefits.

Hydropower also enhances the reliability of the electric system. As a highly flexible firm power resource, hydropower provides load following, spinning reserve, and other "ancillary" services that are critical for keeping the lights on. In addition, emission-free hydropower is ideally suited to firming intermittent renewable resources such as wind and solar power. Therefore, hydropower is not only a renewable resource in its own right, but it also enables additional wind and solar power resources.

III. HYDROPOWER CAN PROVIDE EVEN MORE BENEFITS IN THE FUTURE

In some circles, the conventional wisdom is that while hydropower is a fine resource, it has little growth potential in the future. This is not the case. Instead, given the challenges associated with climate change, we must make a concerted

effort to maximize the use of all emission-free renewable resources, including hydropower.

While the opportunities for building large, new conventional hydropower projects are limited, significant potential exists to add generation capacity at existing hydropower dams and new electrical generation to existing non-hydropower dams. There are also opportunities for entirely new small hydropower facilities. Moreover, substantial new hydropower resources are available from new and innovative hydrokinetic technologies that tap the energy of river, tidal, and ocean currents, without the installation of any dam or impoundment.

Further, considerable potential exists for new "pumped storage" hydropower facilities that pump water into an off-river upper reservoir during off-peak hours when power demand and prices are low (typically at night and on the weekends) and then release the stored water to generate power on-peak during weekdays when demand and power costs are high.

FERC statistics indicate that there are pending license applications for 430 MW of conventional hydropower capacity and 900 MW of pumped storage capacity. Also, there are 448 MW of conventional hydropower capacity, 2,783 MW of pumped storage capacity, and 6,000 MW of hydrokinetic capacity in the pre-filing stage at FERC, before a license application is filed. While not all projects in the pre-filing stage at FERC will mature into applications, these figures demonstrates tremendous interest in new hydropower technologies and pumped storage.

V. WHAT CONGRESS CAN DO TO HELP TAP HYDROPOWER'S NEW POTENTIAL

A. Extend and Expand the Application of the Renewable Production Tax Credit/Clean Renewable Energy Bonds to Hydropower

For Avista, the most important thing Congress can do at this time to spur additional hydropower development at its existing hydropower facilities is to secure a long-term extension and expansion of the production tax credit (PTC) for incremental hydropower that was enacted by Congress as part of the Energy Policy Act of 2005.

Based in part on obtaining the PTC half credit of 0.9 cents per kwh, Avista has embarked on a series of upgrades to its existing hydropower dams, adding at total of 7 MW of capacity to date, with approximately 36 more MW available from further upgrades. Because of the long lead times associated with replacing turbines, it is essential that Congress renew the PTC for an extended period, as well as the counterpart "Clean Renewable Energy Bond" (CREB) program that supports renewable investments by municipal and cooperative utilities.

Avista also strongly supports the landmark agreement recently reached between the National Hydropower Association (NHA), American Rivers (AR), the Union of Concerned Scientists (UCS), Trout Unlimited (TU), and the Natural Heritage Institute (NHI) to support the expansion and application of the PTC and the CREB program to the development of hydropower at non-hydropower dams. Avista commends these parties for working together constructively to develop compromise legislative language to provide PTC and CREB support for hydropower at non-hydropower dams, and greatly appreciates the inclusion of this language in the energy tax bill recently passed by the House. This is an excellent example of how policies regarding hydropower deserve reconsideration in light of the emission-free electricity hydropower provides. Avista also supports the language in the House-passed bill making new hydrokinetic technologies eligible for the PTC and CREB program.

B. Appropriate Treatment of Hydropower in Climate Change "Cap and Trade" Legislation

Climate change legislation is likely to become the biggest policy driver impacting future energy investments, including investment decisions regarding hydropower. Avista believes it is very important that investments made in emission-free resources such as hydropower be rewarded, rather than penalized, in any cap and trade legislation, or other climate change legislation, adopted by Congress. Therefore, Avista urges Congress to allocate the valuable "emission allowances" that are at the center of any cap and trade system to electric utilities based on their electricity output or load served, not based on historic greenhouse gas emissions. Avista also supports work being done by NHA regarding the provision of "bonus allowances" to renewable power resources such as hydropower. Allowance allocation and the many other highly technical provisions of the complex climate change legislation that Congress is considering will have a major impact on hydropower's future. Any climate change legislation should appropriately acknowledge and encourage this important resource.

C. Removal of Regulatory Barriers to Hydropower Development

The regulatory process for the approval of new hydropower resources is often costly, complex, and time consuming, and does not always produce reasonable outcomes. In response, Congress made significant improvements to the licensing process through the adoption of licensing reforms in the Energy Policy Act of 2005. Avista strongly supported these reforms.

Avista appreciates that because hydropower relies on a public resource, the regulatory process must be comprehensive and inclusive so that all impacts and interests are fully considered. However, Congress should carefully monitor how the regulatory process treats the many conventional hydropower, pumped storage, and new hydrokinetic technology projects that are currently in the licensing pipeline at the FERC, the Departments of Interior and Commerce, and at state resource and water quality agencies. If the regulatory process does not result in the timely and reasonable approval of hydropower projects that are in the public interest, Congress should address this matter through oversight, or even legislation, if necessary.

D. Support for Hydropower Research and Development

Federal support for hydropower research and development (R&D) has been minimal to non-existent for many years. This needs to change if we are to tap the full potential for the use of new technology at conventional hydropower facilities, as well as the many benefits that can be obtained from the new hydrokinetic technologies. New R&D investments in hydropower are essential. Congress took an important first step in support of hydropower R&D by appropriating $10 million in FY 2008. Avista strongly supports NHA's efforts to expand this funding to $54 million in FY 2009. Hydropower needs a vigorous and well-funded federal energy R&D program in order to achieve its full potential.

V. CONCLUSION

Avista deeply appreciates the opportunity to testify and commends the Subcommittee for its leadership on the important issue of the contribution of hydropower to our nation's energy future. I am happy to answer any questions that you may have.

Mrs. NAPOLITANO. Mr. Culbertson.

STATEMENT OF TIM CULBERTSON, GENERAL MANAGER, GRANT COUNTY PUBLIC UTILITY DISTRICT, EPHRATA, WASHINGTON

Mr. CULBERTSON. Good afternoon, Madam Chairwoman, Ranking Member McMorris Rodgers and members of the Subcommittee.

My name is Tim Culbertson, general manager of Public Utility District Number 2 in Grant County. I appreciate the opportunity to testify about this very important subject, and would like especially to recognize Ranking Member McMorris Rodgers for inviting me to participate today. I would also like to take a minute and thank the previous panelists for their comments and the statements they have made regarding hydro energy. Grant PUD is a consumer-owned utility that serves a rural predominantly agricultural population in central Washington State. Hydropower, irrigation canal hydropower and wind power compromise our total electric generation capacity of over 2,000 megawatts.

My message today is simple: There is tremendous untapped emission-free hydroelectric generation potential in the United States. Too often hydropower is overlooked or taken for granted. This is an unfortunate oversight because hydropower, which does not generate any greenhouse gas emissions, is a domestic resource that deserves more attention as part of the Nation's renewable energy future. In 1901, Congress passed the first Water Power Act, enabling hydropower to make extraordinary contributions to our Nation's economy and security. With congressional assistance, hy-

dropower capacity in the United States tripled between 1920 and 1940.

Today, existing hydropower generation totals 289 million megawatts hours which represents 7 percent of the net energy generation in the United States. This equates to over 190 million tons of avoided greenhouse gas emissions in the U.S. per year, yet there is more hydropower that can be readily developed. According to the Electric Power and Research Institute, the United States has the potential to develop an additional 10,000 megawatts from new small hydro capacity gains at existing hydro sites and new generation facilities at existing dams by 2025. Let me repeat. 10,000 megawatts of clean, renewable hydropower without building a single large new dam. This is enough renewable energy to serve Washington, D.C., Baltimore, Maryland, and Richmond, Virginia, combined and represents over 29 million tons of potential avoided greenhouse gas emissions per year.

Keeping our Nation's hydropower resources operating while also meeting today's important environmental standards represents a significant investment by utilities and consumers. For example, the Northwest Power and Conservation Council estimates that consumers in the Pacific northwest have invested approximately $9 billion through 2006 on fish and wildlife recovery efforts since the passage of the Northwest Power Act in 1980. For our part, Grant County PUD in collaboration with tribes, Federal and State fish agencies and environmental interests have exceeded the 93 percent fish survival standard for spring chinook salmon at our two hydro projects on the Columbia River.

In April of 2008, the Federal Energy Regulatory Commission unanimously approved the new 44-year license to Grant PUD. Our new license is living proof of the potential energy gains available at existing dams across the country. Our capacity is increasing by 138 megawatts from 1,755 to 893 megawatts as a result of new turbine replacements at Wanapum Dam. These hydro capacity and efficiency improvements ensure that more than 1,000 average megawatts of clean, renewable hydropower along with substantial new natural resource protection measures continues for many years into the future.

I encourage Congress to support and expand policies to increase domestic hydropower capacity, including research and development dollars. I strongly support the $54 million funding request for the Department of Energy's hydropower research and development program. This request is based on the research, development and deployment needs and opportunities identified by the Electric Power and Research Institute. For our part, Grant County PUD has already begun to optimize our hydropower resources with more efficient generating equipment. At Wanapum Dam we are installing new advanced hydro turbines which show a 3 percent efficiency increase in improved fish protection. All 10 turbines at Wanapum Dam will be replaced by the year 2014 at a cost of $150 million. DOE's hydropower R&D program contributed to the development of this new technology.

By the way of new technologies also include new environmental technologies which can translate into more energy output from the same amount of water flow. For example, Grant PUD just com-

pleted the installation of a $35 million fish bypass system at Wanapum Dam to improve fish survival while reducing spill. Better fish passage technologies allow dam operators to potentially reduce nongenerating spills through a dam. The bottom line there is significant untapped emissions-free hydroelectric generation potential in the United States.

Working together, we can increase our Nation's domestic clean energy portfolio and reduce our electric sector emissions by nearly 10 percent. Madam Chairwoman, Ranking Member McMorris Rodgers and members of this Subcommittee, I thank you for your leadership and holding this important hearing on hydropower's significant role as a continued source of clean renewable energy. Thank you.

Mrs. NAPOLITANO. Thank you, Mr. Culbertson. And I am very pleased for the testimony given here in the Subcommittee today.

[The prepared statement of Mr. Culbertson follows:]

Statement of Tim Culbertson, General Manager, Public Utility District No. 2 of Grant County (Grant PUD)

INTRODUCTION

Good Afternoon.

Madam Chairwoman, Ranking Member Cathy McMorris Rodgers and members of the Subcommittee, my name is Tim Culbertson, General Manager of Public Utility District No. 2 of Grant County (Grant PUD). I sincerely appreciate the opportunity to testify about this very important subject, and would like to especially recognize Ranking Member McMorris Rodgers for inviting me to participate today.

Grant PUD is a consumer-owned utility that serves a rural, predominantly agricultural population in central Washington State. Hydropower, irrigation-canal hydropower and wind power comprise our total electric generation capacity of over 2,000 megawatts, which provides clean, emissions-free and renewable electricity for our state's families and businesses, including 43,000 customers in Grant County, as well as millions of consumers throughout the Pacific Northwest.

My message today is simple—there is tremendous untapped, emissions-free hydro electric generation potential in the U.S.

Too often, hydropower is overlooked or taken for granted. This is an unfortunate oversight because hydropower—which does not generate any greenhouse gas emissions—is a domestic resource that deserves more attention as part of the nations renewable energy supply.

HYDROPOWER IS PART OF THE SOLUTION

In 1901, Congress passed the first Water Power Act, enabling hydropower to make extraordinary contributions to our nation's economy and security. With congressional assistance, hydropower capacity in the United Stated tripled between 1920 and 1940.

Today, hydropower is the largest renewable resource in the United States—and there is more hydropower that can be readily obtained. Existing hydropower generation in the U.S. totals 289 million megawatt hours [1], which represents approximately seven percent of the net energy generation in the U.S. Domestic hydropower equates to over 190 million tons of avoided greenhouse gas emissions in the U.S. per year. [2]

According to a March 2007 report released by the Electric Power Research Institute (EPRI), there are 90,000 megawatts of untapped water power generation potential in the U.S. This could produce enough energy to serve the needs of 22 cities the size of Washington, DC and equates to over 250 million tons of potential reductions in greenhouse gas emissions per year that is unrealized in the U.S. [3]

By the year 2025, EPRI reports that the U.S. has the potential to develop 10,000 megawatts (or 11 percent of the total above) from new small hydro, capacity gains at existing hydro sites and new generating facilities at existing dams. Let me repeat: 10,000 megawatts of clean, renewable hydropower without building a single

[1] U.S. Energy Information Administration
[2] Based on the U.S. average emissions of 1,366 lbs/MWh
[3] Based on 50 percent electric generating facility capacity factor

large new dam. This is enough renewable energy to serve Washington, DC, Baltimore, MD and Richmond, VA, and represents over 29 million tons of potential avoided greenhouse gas emissions per year.[4]

HYDROPOWER'S "FIRMING" BENEFITS

Building a sustainable U.S. energy future will require the use of all climate-friendly technologies currently available, as well as new and advanced hydropower technologies. Adding hydropower capacity has the duel benefit of providing significant and much needed "firming" support for other clean, renewable resources.

For example, as the U.S. increases the amount of renewable resources in its overall portfolio, hydropower is one of the few base-load, climate-friendly generating resources well suited to "firming" intermittent or non-dispatchable resources such as wind. Firm power is energy that is guaranteed to be there when you need it. As the development of wind, solar and other intermittent resources grows, hydropower is the perfect partner to "firm" and "shape" those resources because it can respond immediately to fluctuating electricity demand. In addition, today's hydro turbines convert over 90 percent of available energy into electricity, making it one of the most efficient forms of power generation. Without reliable, efficient and climate-friendly base-load "firming" resources such as hydropower, the value of intermittent or non-dispatchable resources is greatly reduced.

ADDITIONAL BENEFITS

Another important attribute of hydropower is that is provides significant peaking capacity and ancillary services to bolster the reliability, stability and resilience of the Nation's transmission system. These ancillary benefits include frequency control, load following, spinning reserve, supplemental reserve and black-start capability. The August 2003 blackout in the East Coast was a testament to these benefits, where hydropower projects in New York and elsewhere remained online and were valuable in restoring power to the region.

COMMITMENT TO ENVIRONMENTAL PROTECTION

Keeping our Nation's hydropower resources operating while also meeting today's important environmental standards represents a significant investment by utilities and consumers. For example, according to the "Sixth Annual Report to the Northwest Governors on Expenditures of the Bonneville Power Administration (BPA)" by the Northwest Power and Conservation Council, consumers in the Pacific Northwest have invested approximately $9 billion through 2006 on fish and wildlife recovery efforts since the passage of the Northwest Power Act in 1980.

For our part, Grant PUD—in collaboration with tribes, federal and state fish agencies and environmental interests—has met or exceeded the 93 percent fish passage survival standard for spring Chinook salmon at our two-dam Priest Rapids Project on the mid-Columbia river. In April 2008, the Federal Energy Regulatory Commission (FERC) unanimously approved a new 44-year license to Grant PUD to operate the Priest Rapids Project. Grant PUD's new license for the Priest Rapids Project is living proof of the potential gains available at existing dams across the country. Our capacity is increasing from 1,755 megawatts under the old license to 1,893 megawatts with turbine replacements at Wanapum Dam—an increase of 138 megawatts. These capacity and efficiency improvements ensure that more than 1,000 average megawatts of clean, renewable hydropower—along with substantial new natural resource protection measures—continues for many years into the future.

OPTIMIZING HYDROPOWER

As described in the EPRI report, 10,000 megawatts of untapped small hydro, capacity gains from existing facilities and new generation facilities at existing dams can be achieved by the year 2025. However, that will require aggressive congressional support and expansion of economic incentives, such as the Production Tax Credit and Clean Renewable Energy Bonds program, to include all hydropower resources and new, advanced technologies.

In addition, federal funding is almost non-existent for the Department of Energy's (DOE) Hydropower & Waterpower R&D Program. This program received a mere $10 million in 2008. At a minimum, $54 million is needed in FY 2009. This amount corresponds to the research, development and deployment needs and opportunities identified in the EPRI report.

For our part, Grant PUD has already begun to optimize existing water resources with more efficient hydro generating equipment. At Wanapum Dam, we are install-

[4] Based on 50 percent electric generating facility capacity factor

ing new advanced hydropower turbines—which show a three percent efficiency increase and improved fish protection. All ten turbines at Wanapum Dam will be replaced with new, advanced hydro turbines by the year 2014, and at a cost of $150 million. DOE's hydropower R&D program contributed to the development of this new technology. Continued and additional federal support, in partnership with industry, is critical to expand the development of untapped, renewable hydropower resources and technologies.

By the way, new technologies also include new environmental technologies, which can translate into more energy output from the same amount of water flow. For example, Grant PUD just completed installation of a $35 million fish bypass system at Wanapum Dam to improve survival for downstream migrating salmon. Better fish passage technologies allow dam operators to potentially reduce non-generating "spill" through a project. As a result, more renewable energy can be generated using the same amount of water. We can increase both fish protection and renewable hydropower generation.

HYDROPOWER WORKS

The bottom line "reducing emissions will require federal partnership and support for the rapid deployment of this substantial untapped, renewable, emissions-free resource. Hydropower can be part of the domestic energy solution and is one of the few base-load, renewable energy sources in the U.S. that is both emissions-free and can "firm" intermittent or non-dispatchable energy, such as wind. Working together, we can realize hydropower's potential, increase our Nation's domestic clean energy portfolio and reduce our electric sector emissions by nearly 10 percent.[5]

Madam Chairwoman, Ranking Member McMorris Rodgers, and members of the Subcommittee, I thank you for your leadership in holding this important hearing on hydropower's significant role as a source of clean, renewable energy for the future.

Thank you.

Mrs. NAPOLITANO. Unfortunately our colleagues are off on a flight somewhere, where we probably will be soon.

This is a critical issue for a lot of us, including my Ranking Member, for number of reasons. We need to try to begin assisting—we can't do it unless we have information and being able to see what is out there and how we can be of service to promote our policy that will make that available to the users.

To all of you, I would like to hear from you in regard to the role that State renewable portfolio standard played in promoting new hydropower generation. And I am most interested in how Oregon, Washington and California all treat conventional and new hydropower differently. Yes, sir.

Mr. CULBERTSON. Well, the State of Washington is interesting because it doesn't include traditional hydro as a renewable resource which we think is fundamentally wrong and flawed. Grant was able to actually craft an agreement with the sponsors of that initiative to include incremental hydro. But the interesting part is Grant and other non-Federal projects and their efficiency improvements are considered renewable, whereas the Federal projects are not considered renewable in their efficiency improvements. So we think there are some flaws in the State of Washington and it is only new low-impact hydro that is given credit as a renewable resource in the State of Washington.

Mrs. NAPOLITANO. Thank you. I think there is something this Subcommittee can take up. Yes, sir.

Mr. ROOS-COLLINS. In California, the renewable portfolio standard recognizes hydropower less than 30 megawatts of capacity as

[5] Based on 250 million tons of potential emission reductions per year that is unrealized in the U.S.

renewable. But let me approach your question from a different angle. The renewable portfolio standard as well as the related climate change legislation which Governor Schwarzenegger signed into law in 2006 have motivated our utilities as well as merchant generators to look for new renewables with a vigor that has never occurred before.

And so as of this month, just to give one example, Pacific Gas and Electric Company has signed procurement contracts for 1,000 or more megawatts of solar thermal capacity. That is approximately 1/5 of its entire hydropower system. It is proposing to have those contracts deliver power within 2 years, 2 to 5 years.

And that is just one example of how the RPS and California is motivating our utilities to look at hydropower as well as other forms of renewable to pick up the pace a bit.

Mrs. NAPOLITANO. Anybody else? Mr. Howard.

Mr. HOWARD. I would echo what Mr. Culbertson said, and I would say that we are hoping that maybe some of the shortcomings of the RPS system, as established in Washington, can be improved over time. Having said that, the standards have—every 2 years we do an integrated resource plan where we re-evaluate future demands and how we are going to meet those. And certainly in part response to the RPS standards, we have indicated a higher degree of renewable development. And evaluating the possibility for incremental improvements in hydro is something we have been doing anyway. It may end up accelerating the rate of some projects as would obviously the extension of the production tax credit.

Mrs. NAPOLITANO. Mr. Corwin.

Mr. CORWIN. Yeah. As far as Oregon goes, renewable portfolio standard, similar to Washington in respect they don't recognize large hydro, small, low—some small-low impact and qualify. But actually on Richard's point, I thought teed up a good side to this. What we are seeing out of all of the renewable portfolio standards is a whole lot of wind being developed in the northwest. And the impacts to that on the hydro system are still becoming known but what we do know is, for example, on the Federal system there is already about 1,400 megawatts of wind that they are integrating into that Federal transmission system.

And part of this—you know, like we said, hydro matches up nicely to firm the wind. But the capacity of the hydro system is getting more and more constrained. And on the Federal hydro system, we lost about 1/8 of it on an average basis over 1,000 average megawatts took constraints on the system for salmon and steelhead under the biological opinions which creates an even tighter system.

So it is going to be a challenge moving forward because we are looking at the wind potentially doubling and then doubling again over the next 10 to 20 years here as far as the amounts coming online.

Mrs. NAPOLITANO. Thank you. Ms. McMorris Rodgers.

Mrs. MCMORRIS RODGERS. Thank you, Madam Chairman, several of you have talked about the potential for new hydropower and both through increased efficiency at existing facilities as well as the low head hydro and pump storage. I just wanted to ask each one of you if you might comment on your perspective as to what is

available, what kind of research is out there and the potential results of this research that is taking place.

Mr. CORWIN. As far as available low head, I haven't studied the studies. I have seen some on the big head hydro, you know, they have had a program in the Federal system—Columbia system over time to rehabilitate several of the projects. And the biggest one there is at Grant Coulee, which does create a little more generation with the new runners coming in. So even without additional head you know you can get a little more generation out of these older facilities.

Mr. CULBERTSON. And I would go back to my testimony at Grant. We are getting 138 megawatts of increased capacity just out of the Wanapum project by doing turbine upgrades alone. We are about to go to bid for generators, which will probably give us another about 50 to 70 megawatts of increased capacity with the generator upgrade. So figure about 200 megawatts of increased efficiency out of that project. As soon as we are done there, the plan is to go downstream to do Priest Rapids and get the same kind of efficiency gains out of the Priest Rapids project. And if in the northwest you look at most hydro projects, they are of the same vintage and we believe that there are the same kind of efficiency gains that can be gained at most of the hydroelectric projects, not only in the northwest but basically the entire west coast which are of the same basic vintage.

Mr. HOWARD. I would just say that we focus our evaluations of research of course on our eight hydro developments and prioritize those on where we can make gains in efficiency and upgrades. And we are engaged in those actively right now on both the Clark Fork River and Spokane River. I would also add that you know I think one potential benefit of R&D dollars is maybe to help identify opportunities that may not be on our radar screens, but there may be a nexus with broader concerns about public safety and infrastructure.

Many privately owned dams all across the country and some publicly owned that could potentially have power benefits and may be achieve both power and safety benefits simultaneously. And then finally, we certainly engage with folks in our service territory who we have other smaller dam owners, as Senator Morton referenced the Sheep Creek projects and others, and we encourage those kind of opportunities that may occur in private lands if they are available as they may also enhance system reliability.

Mr. ROOS-COLLINS. Since the prior answers have focused on inland, I will answer it with regard to ocean. The Minerals Management Service under the U.S. Department of the Interior recently published a programmatic environmental impact statement which looked at the potential capacity as well as the potential impacts of ocean energy development. The Federal Energy Regulatory Commission has begun to look at capacity and impacts in the context of individual proceedings. And other Federal agencies have other information they have developed over time with respect to other ocean uses, such as navigation buoys that may be applicable to hydrokinetic development on the ocean side.

I would recommend to this Subcommittee that you consider two things to help make this information useable. First it would be

helpful for the Federal agencies to consolidate the information they already have in one place so that the information is indeed available to guide the siting decisions. And second, since the marine environment is far less well understood than inland waters, we do need to increase the R&D budget specifically for monitoring so that we can understand impacts of any projects that we would build.

Mrs. NAPOLITANO. Very good. Madam Chairman, I would like to ask unanimous consent to submit the Northwest Power and Conservation Council's 2007 report on carbon dioxide footprint of the northwest power system and the Electric Power Research Institute's assessment of water power potential and development needs into the hearing record.

Mrs. NAPOLITANO. Without objection, so ordered. And I would like to see a copy of it so I can get briefed on some of these issues. I don't need it now. I would like to have it. I am on my way to a flight. So thank you.

Mrs. MCMORRIS RODGERS. Plane reading.

Mrs. NAPOLITANO. Reading material to put me to sleep. Thank you very much.

This has been a very interesting hearing. I would have been out of here about 2:00, right after the last votes. But it is critical. And I am hoping that—thank you all of you for your testimony and to the prior panel. I think we have a lot of work ahead of us and I thank my Ranking Member for bringing it to our attention because sometimes party politics gets in the way. We are hoping that does not happen here. And we will continue to work on issues that are beneficial to our country rather than to our parties. And I say that wholeheartedly because I think that we need to have not only us working together with your help, but also the administration and the agencies that are charged with being able to help us see what is in the future. And updating, upgrading and looking at new technologies is an excellent idea. I think it is long overdue.

It is always a matter of money. However, given the fact that we are looking at drought, at climate change, at rolling blackouts and many other things that are going to be upon us if we are not too—if we are not careful, I think we need to begin to be cognizant of the need to invest in some of the R&D so that we can move forward for our constituency.

And Mr. Corwin, the consolidation is something that I have always believed is necessary and inherent in being able to do a good job but heaven forbid we would ask our agencies to do that. However we will try to be—and I do that tongue-in-cheek because they have worked with us. But the only problem is, sometimes we don't talk to each other. And even on Water 2025 and now it is Water For America, I continually ask for them to let us know what is going on so that we are apprised and we don't spin our wheels asking agencies for things they are already doing in another area.

And with that, I thank everybody. You have been great. I appreciate it. And that concludes the Subcommittee's oversight hearing on hydropower providing 75 percent of America's renewable energy, exploring its role as a continued source of clean renewable water for the future. And I mean our future.

Our thanks to all of our witnesses for appearing before the Subcommittee today. Your testimonies and expertise have indeed been

extremely enlightening and very helpful. And under committee rule 4(h) additional material for the record should be submitted within 10 business days after the hearing. That means anybody in the audience or any of the panelists who want to submit additional paper for the record, information, please do so. You have 10 business days. Your cooperation as witnesses in replying promptly to any questions submitted to you in writing will be very greatly appreciated. And with that, this hearing is adjourned.

[Whereupon, at 4:45 p.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows:]

[A statement submitted for the record by Mr. Lamborn follows:]

Statement of The Honorable Doug Lamborn, a Representative in Congress from the State of Colorado

As a Coloradan and Member of Congress concerned about energy and our natural resources, it is vital that we make a commitment to clean, renewable energy sources such as hydropower. Hydropower generation is critical not only to the Pacific Northwest but the entire country. My own district benefits from no less than three such facilities. It is important that we preserve and increase efficiency in production of hydropower in the United States.

Hydropower composes 7% of the nation's electrical generation. Current U.S. hydropower capacity is about 80,000 megawatts and, according to the Department of Energy, can produce enough electricity for approximately 28 million households.

Hydropower provides a clean, relatively low-cost option for future renewable energy production. Because hydroelectric power is produced domestically, it also reduces U.S. dependency on foreign energy sources.

I applaud the Chairwoman and the Ranking Member for holding this important hearing.

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