Testimony of Tim Culbertson

On behalf of

The National Hydropower Association

Before the

U.S. Senate Committee on Energy & Natural Resources
Subcommittee on Water and Power

Regarding

Impacts of Climate Change on Water Supply and Availability in the United States

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Testimony of the National Hydropower Association before the Senate Energy and Natural Resources Committee, Subcommittee on Water and Power, regarding Impacts of Climate Change on Water Supply and Availability in the United States, Presented by Tim Culbertson, Member of the National Hydropower Association, June 6, 2007

INTRODUCTION

Good afternoon, I am Tim Culbertson, General Manager of Grant County Public Utility District #2 located in the central part of the state of Washington. Grant County PUD is a long time member of the National Hydropower Association (NHA)[1] and I appear before you today to testify on behalf of NHA.

The association greatly appreciates this opportunity to speak to you on the importance of recognizing the critical role hydropower plays to help combat climate change; the potential affects to hydropower resources resulting from climate change; and the planning that is underway, particularly in Washington state and the Pacific Northwest, in preparation for these changes.

Senator Cantwell, members of the Subcommittee, our message to you today is simple – Congress needs to fully consider hydropower and its many system benefits as it debates and develops climate change policy for the U.S. Too often hydropower is overlooked or taken for granted in these discussions. This is an unfortunate oversight because hydropower, a clean and domestic resource, has a significant role to play to combat climate change.

[1] NHA is a non-profit national association dedicated exclusively to advancing the interests of the U.S. hydropower industry, including the new water power technologies – ocean, tidal and instream hydrokinetic power. It seeks to secure hydropower's place as an emissions-free, renewable and reliable energy source that serves national environmental and energy policy objectives. Its membership consists of more than 140 organizations including; public utilities, investor owned utilities, independent power producers, equipment manufacturers, environmental and engineering consultants and attorneys.

Not only is hydropower the largest source of renewable power in the United States, but there is tremendous growth potential that remains untapped. In fact, a new report released by the Electric Power Research Institute (EPRI) conservatively estimates the potential increase in hydropower generation capacity at 23,000 Megawatts (MW) by 2025.[2] This same study also acknowledges that 90,000 MW of hydropower remains undeveloped. With the right government policies a significant portion of this clean homegrown energy could be captured.

However, the industry realizes that the benefits hydropower brings to the table are threatened if climate change is left unchecked. Changes in local conditions, such as the timing and availability of water for power generation, will create challenges in meeting the country's increasing need for electricity, as well as have significant consequences to irrigation, recreation and water supply resources. All of which will have a significant economic impact to this growing region and affect consumers both regionally and nationally. As a result, the hydropower industry and others are beginning to examine these potential impacts and have begun planning for them.

In order to fully meet the challenges posed by the effects of climate change, the industry requests that Congress partner with the private sector to develop the needed strategies and responses. Federal investment in new advanced hydropower technologies – through economic incentives and research and development funding – is critical to assist the industry in its planning and preparation for the impacts climate change will impose on the resource. It is critical that we apply best practices and technological advances to optimize water resources for the benefit of all users. Smart use of policy, planning and technology application is the best path forward.

[2] *Assessment of Waterpower Potential and Development Needs*. EPRI, Palo Alto, CA: 2007. 1014762.

BACKGROUND

Let me take a few moments to provide some information about Grant County PUD; its hydropower resources; and the importance of those resources to Washington state and the Pacific Northwest.

Grant County PUD is a consumer-owned utility, created in 1938 by a popular vote of county residents who struggled for 20 years to receive electricity. Grant County is a rural, predominantly agricultural region. Electricity provided by Grant PUD supports the county's important role in the agricultural sector of Washington state, which accounts for a fifth of the state's annual gross product and employs 173,000 people – more than any other sector in the state.

Grant PUD's energy portfolio is diverse and expanding, which is consistent with Grant PUD's focus on renewable energy, including hydropower. Combined, Grant County PUD's two dams, Priest Rapids and Wanapum on the Columbia River, have a rated capacity of around 2,000 average megawatts (actual generation varies depending on river flow and other factors). In a typical year, 2005, our hydroelectric projects generated enough power to serve over 800,000 homes with clean, reliable and affordable electricity. That is enough to power the entire Seattle area.

This power is also a driving force not only for the Washington state economy, but for the entire Pacific Northwest region. Grant PUD provides electricity at cost to 22 other utilities throughout the Northwest, providing power to millions of consumers in Washington, Idaho, Oregon,

Montana, Utah, Wyoming, and California. Combined, Grant PUD's dams allow the Northwest to avoid 942,000 tons of carbon emissions annually.[3]

IMPACTS ON HYDROPOWER RESOURCES AND THEIR EFFECTS

In 2004, hydropower made up approximately 7% of the electricity generation in the United States. Focusing on the state of Washington, hydropower represents 72% of its electricity generation. As such, the state clearly understands that the potential impacts due to climate change on hydropower resources will have a significant effect on its economy, the lives of its residents, and the environment. As a result, Washington has begun to closely examine those impacts and their effects.

This year, Governor Christine Gregoire signed Executive Order 07-02, which among other things, created the Washington Climate Change Challenge, an initiative designed to consider the full range of policies, strategies and specific steps the state of Washington should take to prepare for the impact of global warming.

As part of the initiative, impacts to hydropower resources were examined. Specifically, effects on mountain glaciers, snow pack and peak flows were analyzed utilizing data summarized in a November 2006 report titled, "Impacts of Climate Change on Washington's Economy."

The report states that mountain glaciers in the North Cascades have lost a significant percentage of their total volume since 1983; that average mountain snow pack in the North Cascades, which

[3] Natural gas combined-cycle turbines are the predominant backup generation source in the Pacific Northwest.

is critical to summer stream flows, has declined at a majority of mountain sites studied causing spring runoff to occur earlier in the year; and finally, that stream flows have been affected resulting in peak flows occurring earlier in the year throughout the state, including the Columbia River Basin.

These impacts are creating changes in the availability of water and the timing and amount of flows. This increases the stress on the hydropower system and affects power output, as well as poses challenges and creates secondary effects on downstream uses such as fish migration, recreation, irrigation, and water supply.

For hydropower, output may be affected as changes in water management become necessary. Simulations of the power market by the University of Washington indicate a possible revenue impact of 5 percent or less, which at today's rates totals $165 million per year.

For salmon and other fish, changes to peak river flows may affect rearing, migration and spawning. Low flows in spring and summer could result in warmer water, which holds less oxygen and can stress fish. In addition, increased temperatures in summer streams may exceed the tolerable limits for coldwater fish.

In the end, all the additional uses of the water – recreation, irrigation, water supply – for which hydropower projects provide, will be affected in one way or another by changes in the amount and timing of flows.

For a hydropower system that is as highly regulated as that in the state of Washington, the additional stress brought on by climate change will exacerbate tensions between the competing water users and their needs. The challenge we face is ensuring our current policies, particularly regulatory frameworks, are flexible enough to withstand the additional stress and result in the appropriate balance of these competing needs.

PLANNING FOR IMPACTS

Grant County PUD recognizes that as climate impacts to the nation's rivers unfold, steps will need to be taken to address them. For its part, the PUD has begun to optimize its existing water resource with the installation of more efficient generating equipment with the utilization of the advanced hydropower turbine at Wanapum Dam. The PUD is currently in design for new turbines and generators at Priest Rapids Dam for additional efficiencies. Installing more efficient equipment will provide more power with the same amount of water.

Variability in the amount of water and timing of the water from year to year is not unusual for the hydropower industry. Grant County PUD participates in a coordination agreement with federal and non-federal dam operators on the Columbia and Snake Rivers. In addition, long and

short term water planning of the system is discussed with regional operators as often as weekly throughout the runoff season.

In addition to Grant County PUD's investments in equipment and river coordination agreements, hydropower, in general, is an excellent adaptor. During drought or excess water years,

hydropower's built-in flexibility helps to address changing water conditions and the many pressures on the system. While there are several things that can be done to help plan for future impacts, the advantages contained in hydropower's flexibility and ability to adapt once again highlight its role as part of the climate change solution.

Beyond the hydropower industry's efforts, all around the country, state, regional and local initiatives are underway to investigate the impacts of climate change. From the work of the Northeast states participating in the Regional Greenhouse Gas Initiative (RGGI) to California's passage of its greenhouse gas emissions bill, governments, industries, and the public are actively engaged in climate change planning and preparation.

As mentioned earlier, Washington state in particular, is taking aggressive steps to address climate change. The Washington Climate Change Challenge, which has engaged business, community and environmental leaders over this year, will culminate in specific recommendations to both the Governor and the state Legislature.

Currently, a Climate Advisory Team composed of about 30 leaders from business, labor, and local jurisdictions, is hard at work reviewing policies and potential strategies for slowing climate change. They are working with Technical Working Groups to analyze impacts and actions focusing on the agriculture, energy supply (including hydropower), forestry, transportation, and residential, commercial and industrial sectors.

Washington is also working closely with other western states – California, Oregon, New Mexico and Arizona – and together they have established the Western Regional Climate Action Initiative to collaborate on identifying, evaluating and implementing ways to reduce greenhouse gas emissions.

The work underway, from that of individual utilities to regional groups, is important in order for the hydropower industry to prepare for climate change and other impacts on water – from regulation to transportation, and from fish needs to irrigation needs. Coordination of runoff planning for the many uses of water will be more difficult as the predicted events of climate change unfold. Additional long term planning for water storage and support for hydropower operations is necessary to address the future uses of the hydropower system.

HYDROPOWER'S ROLE IN COMBATING CLIMATE CHANGE

Hydropower should be encouraged and supported to play an important part in solving the climate problem. Reducing greenhouse gas emissions will require the use of all of the climate-friendly technologies currently available, as well as new technologies.

Hydropower provides significant benefits and potentially even greater benefits in the future, if properly supported. Beyond the fact that it is renewable, climate friendly, and domestic, hydropower offers some advantages over other resource options.

Hydropower provides significant generation, peaking capacity, and ancillary services to bolster the reliability, stability, and resilience of the nation's transmission system. This includes

frequency control, regulation, load following, spinning reserve, supplemental reserve and blackstart capability. The August 2003 blackout on the east coast was a testament to these benefits, where hydropower projects in New York and elsewhere remained online and were critical in restoring power to the area.

In addition, as the U.S. significantly increases the amount of renewable resources in its overall portfolio, hydropower offers one other significant advantage. Hydropower is one of the few resources suited to "firming" intermittent or non-dispatchable resources such as wind. As the development of wind, solar and other intermittent resources grows, as is widely expected, the need for "firming" resources will become even more important. Without these "firming" resources, the value of intermittent or non-dispatchable resources is greatly reduced.

Today, hydropower accounts for approximately 77% of the actual renewable electricity generation and 83% of the nation's renewable energy capacity. As robust a resource as hydropower is today, there remains tremendous growth potential for the industry. As stated earlier, a new EPRI report finds the potential increase in generation capacity at 23,000 MW by 2025. To put this in perspective, the total installed generating capacity for wind is approximately 9000 MW.

The EPRI estimate includes: 2,300 MW capacity gains at existing conventional hydropower (incremental hydropower); 5,000 MW of new conventional hydropower at existing non-powered dams[4]; 2,700 MW of new small and low power conventional hydropower (<30 MW installed capacity); 10,000 MW from ocean wave energy; and 3,000 MW from hydrokinetic technologies.

[4] Currently only 2 percent of U.S. dams have hydropower facilities.

The EPRI report also states that these estimates could be significantly increased if economic incentives and regulatory processing for the industries are enhanced. The overall resource potential, based on resource assessments conducted by the U.S. Department of Energy (DOE), EPRI, and industry is estimated to range from 85,000 to 95,000 MW. This represents a doubling of hydropower's current contribution to the nation's energy supply.

If the U.S. is serious about its response to the effects of climate change, then federal support for the development of this untapped potential is necessary.

Hydropower resources should be treated as fairly and equitably as any other renewable energy resource under any proposed national renewable portfolio standard, which should include incremental hydropower, hydropower at existing non-powered dams and the new hydropower technologies – ocean, tidal and instream hydrokinetic power.

Economic incentives, such as the Production Tax Credit and the Clean Renewable Energy Bonds program should be extended long term, fully funded, and expanded to include more resources such as additional hydropower at non-powered dams and the new technologies. Credit parity, so that all new renewable resources brought on-line receive the same credit amount, should also be adopted.

To that end, NHA applauds Senator Cantwell for proposing S.1370, the Clean Energy Investment Assurance Act of 2007, and for her continuing support of the hydropower resource. The bill, co-sponsored by Senator Gordon Smith and Senator John Kerry, addresses these needed

changes to the PTC and CREBs programs, resulting in increased clean renewable hydropower being brought online throughout the U.S.

Finally, the hydropower research and development program at the Department of Energy should be reinstituted and expanded to include initiatives for both the conventional industry and the ocean, tidal, and hydrokinetic technologies. Advanced turbine designs for conventional hydropower have shown promising first round results. Grant County PUD utilized the DOE R&D program as a private-public partnership in developing the advanced turbine now being deployed at Wanapum Dam. Seeing the program to completion and supporting the necessary studies for the development of the new technologies are crucial if these advancements are to succeed and gain acceptance.

With the proper support outlined above, the hydropower industry will be able to responsibly develop the identified growth potential, thus significantly contributing to the climate change solution.

CONCLUSION

Members of the Subcommittee, let me conclude with these final thoughts. The hydropower industry must remain actively engaged in the discussions on climate change. We have begun, along with state and local partners, to undertake an examination of the issues; to review policies to address them; and to take steps to mitigate potential effects.

However, there is also an important role for the federal government to play. NHA encourages the Congress not only to work with the industry to develop a better understanding of climate change impacts to the resource, but to provide the policy support necessary to realize the industry's substantial growth potential.

Most important, the federal government must step up and reinvest in hydropower and new waterpower technologies, which allow us to maximize the water resource with the application of new advancements. The DOE program must be reinstated and the federal hydropower system should cooperate with the non-federal sector to study and deploy new advanced technologies to achieve this goal.

Senator Cantwell we commend you for your leadership in holding this hearing on the interplay between climate change and the hydropower resource. Climate issues are some of the most complex of our time. NHA and the hydropower industry look forward to working with you and other policymakers and we offer ourselves as a resource for future climate hearings or other events.

Thank you.