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**House Appropriations Energy and Water Subcommittee**  
**Department of Energy (Water Power Program)**

The National Hydropower Association (NHA)<sup>1</sup> appreciates the opportunity to submit this statement regarding hydropower research and development (R&D) funding priorities for the FY 2012 appropriations budget cycle.

**NHA requests \$100 million in the FY 2012 Energy & Water Appropriations bill for the Department of Energy’s (DOE) Waterpower Program** to support initiatives across all hydropower technology sectors. The types of technologies covered are conventional hydropower, including pumped storage, as well as marine and hydrokinetic (MHK) technologies that access energy in ocean waves, tides, and the flowing water in rivers and man-made channels.

A \$100 million funding level, split equally between the conventional and MHK programs, is necessary to support a national goal to double U.S. capacity of renewable hydropower and the research needed to increase production and create more than 1.4 million cumulative new jobs all across the country. Investment in hydropower R&D will drive innovation across the economy and maintain American competitiveness and create jobs.

Taking maximum advantage of our nation’s hydropower infrastructure by increasing efficiencies at existing hydro facilities and adding capacity at non-powered dams are two near-term steps in the long-term effort to expand hydropower resources. However, development of some of this capacity requires necessary and needed R&D investment (both short and long term) in order to advance the state of the technology, study potential impacts, understand the extent of the developable resource and more.

In particular, government funding is needed at the front end when private investments would not recoup the full value of the resulting social good. This is especially true in the case of basic R&D initiatives, where under-investment is prevalent and is equally relevant to MHK technologies.

### **Hydropower’s Current and Potential Contribution**

As America’s leading renewable electricity resource, hydropower currently provides approximately 7 percent of our nation’s electricity supply and two thirds of America’s

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<sup>1</sup> NHA is a non-profit, national trade association dedicated to promoting the nation’s largest renewable resource and advancing the interests of the hydropower and new ocean, tidal, conduit and in-stream hydrokinetic industries and the consumers they serve.

renewable electricity.<sup>2</sup> In addition, hydropower is positioned to meet 20 percent of President Obama's goal of 80 percent clean energy by 2035.

Looking to the future, NHA believes hydropower can double its contribution to the nation's electricity portfolio, providing affordable, reliable, and sustainable baseload electricity through the responsible development and expanded use of conventional hydropower, pumped storage and new technologies, both MHK and conduit applications.

Support for this forecast is evident. With approximately 100,000 MW of installed capacity today, recent studies have determined that 60,000 MW of growth is possible by 2025 alone. Right now, there are projects with over 88,000 MW of capacity before the Federal Energy Regulatory Commission (FERC). Applications for DOE Waterpower program funding opportunities in the past far outnumbered available funds – both for new MHK and conventional technologies. For example, in 2010 DOE awarded \$32 million to 7 projects to pursue upgrades to existing facilities, although dozens more projects submitted applications.

These investments have been particularly important to marine and hydrokinetic technologies, which represent a promising opportunity to create reliable, clean energy. While these technologies are currently in various stages of research, development and deployment, industry estimates show US wave potential at 90GW. In 2010, the Department of Energy awarded Snohomish County PUD, among others, matching funding to study water quality and evaluating fish and marine mammal presence of its tidal pilot project in the Puget Sound Admiralty Inlet. Research, development and demonstration funding for projects like this are essential to tap the potential of this emerging technology.

In addition to the new generation this development will bring online, hydropower projects provide a host of ancillary services to the grid and environmental benefits. Hydropower facilities can quickly go from zero power to maximum output, making them exceptionally good at meeting rapidly changing demands for electricity throughout the day. In fact, because of its ability to be quickly dispatched, and its blackstart capability, hydropower was key in restoring power to the grid during the 2003 Northeast blackout. From a clean air perspective, hydropower generation in 2009 avoided over 196 million metric tons of carbon emissions<sup>3</sup>.

### **Hydropower's R&D needs span all industry sectors – conventional, new hydrokinetic technologies and pumped storage**

To realize the opportunity to increase hydropower generation that will strengthen our economy, environment and renewable energy supplies, continued and expanded funding support is needed to develop and deploy novel technologies, improve operational procedures, and provide rigorous analysis. Under a fully funded DOE Water Power program, all involved

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<sup>2</sup> Based on 2009 generation data. Energy Information Administration.

[http://www.eia.doe.gov/cneaf/electricity/epm/table1\\_1.html](http://www.eia.doe.gov/cneaf/electricity/epm/table1_1.html)

<sup>3</sup> According to EPA Carbon Equivalencies Calculator <http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>

interests will have better access to information on the potential extractable energy from rivers and coastal waters; and technical support to harness this renewable resource through sustainable and cost-effective electric generation.

Funding to support these goals should be directed to:

**Technology Development and Demonstration** – Improving hydropower technologies is the most important function of the Water Power Program. Through previous funding, increases in efficiency and decreases in environmental impact have been realized. This investment must continue. New materials research and development and testing of better small and low-head hydro technologies would bring down the costs of converting existing infrastructure for electricity generation and result in important upgrades and modernization of existing power plants.

Along these lines, initiatives that may be pursued include (but are not limited to):

- Deployment support for projects, both MHK and conventional hydro
- Feasibility studies to identify additional low-cost, advanced-technology opportunities (Hydro Advancement Project)
- Development of operational tools, standard methods, and best practices to maximize generation at existing and new facilities

**Resource Assessment/Environmental** - Innovation in the hydropower industry also goes beyond creating new technologies. The DOE program plays an important role in gathering baseline industry data, developing updated resource assessments and new growth analyses, studying project operations for maximization of both energy and environmental values, as well as studying new issues that may affect the industry — from potential effects of climate change on operations to addressing the energy storage needs to maintain a secure and functioning electric grid. Another key role for DOE is to determine the potential capacity on existing infrastructure. The work on the National Hydropower Assets Assessment Program is one example of a valuable tool that needs continued support. Also, the creation of a data clearing house of studies and funding for operations benchmarking would enable both the conventional and MHK industries to better forecast and model data and demonstrate the cost effectiveness of projects.

Additional activities include:

- Identify resources and address technology/policy needs to maximize medium-long term opportunities
- Integrate resource assessments and cost curves with key pumped storage and small hydro technology needs to identify critical COE drivers
- Provide market analysis to accurately quantify and monetize hydropower ancillary services

**Regulatory Analysis** - In addition to these areas, hydropower development faces a comprehensive regulatory approval process that involves many participants that includes FERC, federal and state resource agencies, local governments, tribes, NGOs and the public. The system strives to promote development while protecting important environmental values. However, it can also contain redundancies and inefficiencies that unnecessarily slow the deployment of clean renewable hydropower and delay much-needed environmental enhancements and benefits. At a time when we need all the renewable, affordable and reliable energy we can get, the United States needs an updated regulatory process that gets projects off the drawing board and puts people to work in a more efficient way. To support these efforts, programmatic funding could:

- Engage regulators and environmental stakeholders to reduce license time and cost
- Align energy generation and environmental priorities across river basins to facilitate development
- Generate data to more accurately correlate generation with environmental impacts

### **Associated Funding Support for Hydropower Development within the Civil Works Programs of the Army Corps of Engineers**

NHA is also working in partnership with federal agencies to identify and pursue smarter and more efficient processes to develop hydropower projects on federal facilities. A new Memorandum of Understanding signed recently by the Army Corps of Engineers and the FERC demonstrates an on-going and active commitment to work together and identify current challenges and opportunities to increase hydropower development.

In this vein, NHA also calls for support of the Corps' own efforts to operate, maintain and upgrade its existing hydropower projects. NHA specifically supports the work the Corps is doing under its Hydropower Modernization Initiative (HMI) to develop a long-term capital investment strategy. One significant feature of the HMI is the Asset Investment Planning Tool, which was designed to: (1) analyze the condition of critical components and the consequences of failure; (2) determine the value of additional hydropower and its cost; (3) quantify risk exposure for capital investments; and (4) create 20-year funding scenarios to allow for timely and cost-effective rehabilitation or replacement of hydropower facilities and their components. To assist the Federal government in rehabilitating aging equipment, the Corps also is pursuing increased use of non-Federal funds.

### **Conclusion**

Unlocking the vast hydropower potential of our rivers, oceans, tides and conduits requires funding the R&D initiatives that make innovative ideas a reality. The DOE Water Power Program is an important source of support for the researchers, scientists and developers working to grow hydropower's contribution to our country's clean energy resources. Continued investment in this program is crucial to ensuring that innovative new technologies come to market and are able to generate the clean electricity America needs.

And the hydropower industry itself is doing its part to support investment in new technologies and project improvements. Among the hundreds of millions of dollars invested each year in environmental enhancements at hydro facilities, companies are supporting the development of a new generation of turbines that improve fish passage, generate more power, utilize water more efficiently, and improve the oxygen content of the water released downstream of a facility, among many other inventive technological and operational advancements.