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Testimony
Before the Subcommittee on Energy and Mineral Resources
of the Committee on Resources
United States House of Representatives

Hearing on the Renewable Ocean Energy: Tides, Currents and Waves
September 18, 2006

On behalf of Verdant Power, I wish to thank Chairman Gibbons, Congresswoman Drake and the Subcommittee on Energy and Mineral Resources for the opportunity to speak at this hearing on Renewable Ocean Energy: Tides, Currents and Waves to discuss the potential of kinetic hydro generation, Verdant Power, and the influences that government policy and regulation can have in shaping this exciting new segment of the hydropower industry.

Formed in 2000, Verdant Power is a sustainable energy developer using free-flow turbine or kinetic hydropower systems that generate utility and village-scale electric power. The systems do not require water impoundments thus greatly reducing environmental impacts and siting constraints. Verdant Power's work includes in-stream and waterways assessments for TVA, FERC, New York, and Brazil, and the annual EPRI Renewable Energy Technical Assessment Guide (RE-TAG) report. Current initiatives include installing the first units of a 10 MW free-flow turbine commercial distributed generation project in New York City's East River – a world first. The Company is partnered with NYSERDA and recently has received its permit from the State's Department of Environmental Conservation and the U.S. Army Corps of Engineers for the second phase of the project. Verdant Power's efforts also have included in-stream tests with the Gorlov Helical Turbine in Massachusetts and the Underwater Electric Kite (UEK) system in Canada. These efforts have required that Verdant Power develop the first FERC approved field test with connections to an end user based on effectively having no net impact on the grid or on interstate commerce.

Verdant Power also is pursuing development partnerships and projects in the UK for its tidal turbine systems and Canada for its river turbine systems. It also is building relationships in India and China. The Company has been featured on NBC and the Discovery Channel, and has been written about in over 100 articles, including *BusinessWeek, New York Times, Engineering News-Record* (January 24, 2005), *Hydro Review* (October 2005), and *Power Engineering* (January 2005) – "Renewable Energy: Moving into the Mainstream." *Esquire* has recognized Verdant Power as among the Nation's "best and brightest."

After six years of technology development and work with regulatory agencies, Verdant Power is now poised to install the first six turbines of a commercial scale field that will ultimately provide 10 MW of renewable, predictable, reliable environmentally friendly power to New York City. This monumental step is only the first step in commercial scale demonstration of the technology that has potential application wherever there is flowing water of sufficient speed. Current plans include tests in other tidal settings, river applications and potentially manmade channels. All of these approaches have potential application in Virginia and its coastal waters. Nationally these technologies could produce over 10,000 MW of new capacity, equivalent to the current wind capacity.

Nationally the untapped river potential has been estimated at **297,000** MWa.[1] In Virginia the untapped river potential has been estimated by DOE to be in excess of 418 MWa. This figure does not include any estimations for energy from ocean or tidal currents in part because there currently is insufficient data on which to base an estimation. This is one of the areas that additional support at the state and federal level can help the industry reach its full commercial and environmental potential.

Even with its relatively brief history Verdant Power has emerged as one of the industry leaders in the new kinetic segment of the hydropower industry. As a leader Verdant Power has had to face many of the industry's early challenges directly and try to forge a path. In this pioneering role, we have come to appreciate how government, understanding the needs of the industry, the environment and regional economies can lay the groundwork for sustainable development. We have also seen that in those situations where government is not properly informed and engaged as a partner, the path of progress can be expensive and fraught with delays.

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[1] DOE-ID-11263 Feasibility Assessment of the Water Energy Resources of the United States for New Low Power and Small Hydro Classes of Hydroelectric Plants; Douglas G. Hall, INL, Kelly S. Reeves, NPS, Julie Brizzee, INL, Randy D. Lee, INL, Gregory R. Carroll, BNI, Garold L. Published January 2006 Prepared for the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Wind and Hydropower Technologies Program

This segment of the industry is positioned to provide a significant increase in the renewable energy production of the United States. To grow, the industry needs government support in 3 basic areas:

Research - to identify promising technologies and resources.
Regulatory structure - to provide a sound basis for decisions on which technology and sites can be developed and financed.
Incentives - to bridge the gap from technically promising to commercially competitive.

Research

In the area of research Verdant Power has been fortunate to have as one of its early partners the New York State Energy Research and Development Authority (NYSERDA). In its role of advancing new technologies NYSERDA has been a large part of Verdant Power's success to date. But this is not sufficient for the kinetic segment of the hydro industry to advance. Even with NYSERDA's assistance, Verdant Power's efforts have been focused in only a very few technical areas. The industry needs the funding and cooperation of federal labs such as the Oak Ridge National Laboratory (ORNL) to assess and refine technologies for field application. To fully capitalize on the potential of this technology, research is needed in areas such as turbine design, generator efficiency, control systems and unit configuration. These will all contribute to more efficient energy capture at lower cost and lower impacts. Many of these needs are at an early enough state of development that they can benefit greatly from joint industry /government research without interfering with the competitive marketplace. The Verdant Power / NYSERDA model, used on a regional or national basis could provide the means for identifying promising technologies and validating their readiness for field demonstrations.

In the area of field research the industry also needs assistance in defining promising resource areas and developing criteria to assess and rank these resources. Criteria that would look at energy potential, key factors to development such as supporting infrastructure, as well as environmental impacts would reduce the subjectivity of assessments while helping the industry and government regulatory agencies to identify the most promising areas to be developed. This last item is one of the critical factors facing the Mineral Management Service (MMS) as it looks to establish its regulatory process for the outer continental self (OCS). It is also an area of research that will help to influence the Federal Energy Regulatory Commission (FERC) as it works to incorporate these new free-flowing technologies into its regulatory process. The Electric Power Research Institute (EPRI) has made some very promising first steps in this area, but those efforts have been limited primarily by funding issue. Additional government engagement and funding would advance the effort and help to insure its impartiality.

Toward these goals, Verdant Power supports the research program proposed earlier this year by the Ocean Renewable Energy Coalition (OREC) as a good starting point. The proposed program would fund research in the following 4 areas at the level of approximately $60 million over fiscal 2007-2009:

Basic and applied technology research,
Test Facility & Ocean demonstration projects,
Identify location and permit test facility,
Resource mapping and assessment

Regulatory Structure

Both the FERC and MMS are currently working through the issues of how these new technologies will fit into their existing regulatory requirement (in the case of FERC) and proposed new guidelines (in the case of MMS). FERC currently has over 20 preliminary permit applications pending, some for competing sites. MMS is not accepting new applications as it looks at formulating its regulatory structure for the OCS. In both these situations developer and their potential backers are left in a uncertain situation as to what will be the ultimate regulatory requirement for proposed projects, who will have final jurisdiction and how will competing agency requirements be resolved. When you add state and local municipal requirements to the federal requirements developers like Verdant Power and others are subjected to an almost insurmountable barrier to bringing forward new projects. It is nearly impossible for financial backers to look at this ill-defined situation and make decisions to make significant investment in new technologies when comparable returns can be made in more stable segments of the energy industry such as wind.

Verdant Power recognizes that there are a number of local, state, regional and national interests that need to be protected in the pursuit of any development of domestic energy. We pride ourselves at having worked very hard to identify and respond to stakeholder and agency interests at all levels as we have pursued our first project. In the process we have recognized that there is a substantial cost in responding to these concerns in both time and money. We also believe there needs to be a better structure of the associated regulation that allows the community interests to be responded to without placing an insurmountable burden and delays on the developer.

Toward this end we offer the following recommendations that were part of the recommendations submitted and accepted by the Western Governors Association's Clean and Diversified Energy Initiative:

Recommendation 11. Clarify permitting programs to encourage demonstration projects by making a distinction between the requirements for demonstration projects and long term commercial development. This would speed the process to put demonstration projects in the water to gather performance and environmental information. Information gathered from these demonstrations could serve as the basis for conditions for licensing of full scale commercial operations.
Recommendation 12. Amend permitting programs to make a distinction in the requirements for deployment in manmade channels as opposed to natural streams and estuaries to acknowledge the anticipated lesser environmental impacts and allow projects in manmade channels to proceed at an accelerated pace. This would advance information gathering on technical performance and aid in the decision process for technologies to be deployed in natural streams and estuaries.
Recommendation 13. Develop collaborative permitting programs at the state and regional level that coordinate requirements from all of the jurisdictional agencies, including federal, to avoid duplicative processes and reduce the time and cost to deploy demonstration and ultimately commercial projects.
Recommendation 16. Lead activities to streamline the process for licensing, leasing, and permitting ocean and wave energy facilities in U.S. waters.
Recommendation 18. Ensure that development rights are allocated through a

transparent process that takes into account state, local, and public concerns.

Verdant Power further recommends that a single agency be given lead authority for permitting and regulatory requirements. All other agencies and departments at the federal, state and local level would participate under the lead agency's auspices. Conflict in individual regulatory requirements would be weighed and balanced and resolved by this lead agency. Verdant Power believes that a single point of responsibility is needed to balance the issues of energy supply, environmental protection, community development, energy reliability and cost if the new kinetic technology is to fulfill its potential.

Finally, we believe that the FERC preliminary permit process as it is applied to kinetic hydroelectric projects should be altered. Today, permit applications covering huge expanses of water (e.g., the entire Long Island Sound!) are pending at FERC. Under FERC rules, applicants have little or no burden of demonstrating the technical or financial means to develop projects in areas covered by the application. Permits granted under these rules have the potential to stifle competition and development greatly hindering this emerging industry.

Incentives

The history of the wind industry has shown that if a new energy technology is going to achieve its potential it needs encouragement. Over the past 30 years wind has progressed from a promising concept to its current capacity of approximately 10,000 MW with the help of direct government research and incentive programs such as the Production Tax Credit (PTC). The PTC serves the laudable purpose of improving the financial picture for fledgling technologies and allowing them to compete with more established technologies and their long established infrastructure. For example, the availability of the PTC has spurred the recent major expansion we have seen in the wind industry.

Under the Energy Policy Act of 2005, PTC was extended to 2008 and the definition was expanded to include efficiency and capacity improvements at traditional hydroelectric facilities. Although ocean, tidal and ocean thermal technologies were identified in the Energy Policy Act in other provisions, they were not included in the PTC. We believe this was a matter of oversight and lack of familiarity with this emerging industry. Verdant Power believes this oversight should be corrected. The definition of power sources that can take advantage of the PTC and corresponding Clean Renewable Energy Bond (CREB) programs should be expanded to include tidal, ocean current, wave, ocean thermal and kinetic flow in rivers, stream and manmade channels. The effective dates for the program should be extended from its current 2008 expiration to at least 2016. This will provide a degree of certainty on which developers and funders can make decisions regarding which projects to pursue.

In closing, on behalf of Verdant Power, I would again like to thank Chairman Gibbons, Congresswoman Drake and the Subcommittee on Energy and Mineral Resources for this opportunity to express our concerns about the future development of kinetic hydropower and steps the subcommittee and the Congress may be able to take to ensure that this exciting new segment of the hydropower industry is able to make its full contribution to the nation's secure, domestic, reliable environmental benign energy production. I would further encourage the subcommittee to pursue all 3 initiatives that Verdant Power has outlined in this testimony:

Research - to identify promising technologies and resources.
Regulatory structure - to provide a sound basis for decisions on which technology and sites can be developed and financed.
Incentives - to bridge the gap from technically promising to commercially competitive.

Thank you,

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