Mr. George M. Hagerman, Jr.

Senior Research Associate
Virginia Tech Advanced Research Institute
Arlington, Virginia

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

Hearing on Renewable Ocean Energy
September 18, 2006

The following comments do not represent the position of Virginia Tech but represent my views as a citizen of Virginia and a research engineer with over 25 years experience in the field of renewable ocean energy conversion.

From 1980 to 1985, I worked for Gibbs & Cox, Inc., a naval architecture firm in Arlington, Virginia, in support of the U.S. Department of Energy's ocean energy program, which at that time was focused primarily on ocean thermal energy conversion (OTEC).

In 1986, I formed SEASUN Power Systems in Alexandria, Virginia, where I conducted regional wave energy resource and technology assessments for private utilities and state government organizations in California, Hawaii, Virginia, and North Carolina. With financial support from the U.S. National Science Foundation, Virginia's Center for Innovative Technology, and limited private funding, I also carried out extensive numerical and physical modeling of wave-powered desalination systems.

In 1996-97, I was again hired by Gibbs & Cox, Inc. to manage a fully integrated feasibility study of a land-based OTEC plant for a commercial client in Puerto Rico, where I was responsible for direction of seven junior engineers and coordination of sub-contractor activities.

In 1999, I was hired by Virginia Tech, where I am now a Senior Research Associate at the Advanced Research Institute in Arlington, Virginia. Recent and ongoing ocean energy projects include evaluation of coastal wind data to estimate turbine output for a proposed wind energy project on Virginia's Eastern Shore, a preliminary assessment of the wave energy resource potential off southern New England, and potential project site characterizations for the U.S. Electric Power Research Institute's (EPRI's) offshore wave energy feasibility study for Hawaii, Oregon, Washington, Massachusetts, and Maine. EPRI has just completed a similar feasibility study of tidal in-stream energy conversion, with participation by and co-funding from Nova Scotia, New Brunswick, Maine, Massachusetts, Alaska, San Francisco, and utilities in the Puget Sound area of Washington. As with EPRI's offshore wave energy program, I was responsible for energy resource assessment and site characterization.

Despite my extensive experience in ocean wave and tidal stream energy conversion, I want to focus my testimony on offshore wind energy, particularly its energy and economic benefits to my home state of Virginia. I do so with the intent of focusing the Committee's attention on the ongoing rulemaking process being undertaken by the Minerals Management Service (MMS), which is authorized by the Energy Policy Act of 2005 to regulate all renewable energy uses in federal waters of the Outer Continental Shelf.

The slides of my oral presentation document the substantial potential energy and economic benefits of offshore wind energy development in federal waters off the coast of Virginia. Using commercially available technology at already-realized turbine spacing densities, Virginia could meet 20% of its electrical energy demand with offshore wind, using a total ocean area the size of the City of Virginia Beach (640 sq.km), which is only 2.6% of the administrative area assigned by MMS to Virginia in its most recent lateral boundaries designation.

Assuming an installation rate of 325 MW per year, the build-out of 6,500 MW of total offshore wind project capacity would generate $150 to $200 million in marine fabrication and installation contracts over a 20-year period, followed by a similar value of offshore service contracts for the collective life of these projects.

It also should be noted that from a federal royalty income perspective, the energy receipts from this level of offshore wind development in Virginia's OCS are at least comparable to and possibly double the energy receipts from conventional offshore gas reserves, as estimated by the Virginia Dept. of Mines, Minerals and Energy. To the extent that bonus bid and royalty revenues are shared with the state, offshore wind energy development represents a large potential source of income to Virginia's state treasury.

Hybrid offshore wind and offshore gas combustion turbine projects offer many advantages, as summarized in the last slide of my presentation. These include increased revenues derived from having a completely dispatchable baseload power supply, and the much lower environmental impact and greater security of submarine power cable vs. pipeline energy transmission to shore.

Eclipse Energy's Ormonde project is an example of such a hybrid, combining 108 MW of offshore wind power capacity with 98 MW of natural gas generation. It is expected to begin generation in 2007 (see http://seapower-generation.co.uk/eis.htm).

Another renewable ocean energy resource that deserves consideration is marine biomass, which represents a sustainable source of offshore methane that can replace offshore fossil gas in hybrid wind-gas generation projects as described above, once the offshore fossil reserves are depleted.

Thank you for this opportunity to comment, and I would be happy to answer any questions or provide additional information.

George Hagerman
Senior Research Associate
VT Advanced Research Institute
hagerman@vt.edu