

Exploring Offshore Wind for Virginia

Energy Virginia 2006 Pre-Conference Workshop Report

*October 2006
SENTECH, Inc.*

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I. INTRODUCTION

The inaugural Energy Virginia Conference, which took place October 17-18, 2006 at the Virginia Military Institute (VMI) in Lexington, brought together a host of people from across the state and region to discuss a broad range of energy issues affecting Virginia. A pre-conference workshop, Exploring Offshore Wind for Virginia, was held on October 16, 2006, and included fifteen participants representing academia, utilities, state government, and the private sector (see Appendix A for participant list). The workshop was organized by Patty Kappaz and Brian Levite of SENTECH, Inc. and George Hagerman of the Virginia Tech Advanced Research Institute, with support from VMI and SAIC. Mr. Levite and Mr. Hagerman co-led the workshop.

The U.S. Department of Energy estimates that more than 900,000 megawatts of wind generation capacity, an amount roughly equivalent to the total current installed U.S. electrical capacity, exists within 50 miles off our coasts. Much of that wind power potential lies off the shores of Virginia. This workshop was an effort to educate and commence dialogue with a broad cross-section of stakeholders in Virginia on the issues needing to be addressed for offshore wind power development to take shape in Virginia.

Neil Rondorf of SAIC kicked off the workshop with an introduction of the speakers and the issues to be discussed. This was followed by a series of presentations covering the following four topics:

- Wind and offshore wind energy fundamentals
- Potential energy and economic benefits of offshore wind power for Virginia
- Potential environmental effects of offshore wind power
- Offshore wind policy issues

The workshop concluded with a facilitated group discussion that examined the future of offshore wind in Virginia and identified actions needed to move forward.

II. PRESENTATIONS

The first part of the workshop involved four informative presentations given by Brian Levite and George Hagerman. Participants were given the opportunity to ask questions after each presentation. Issues identified during the question and answer sessions that required further in-depth discussion were noted and addressed during the facilitated discussion at the end of the workshop.

Brian Levite delivered the first presentation, which covered wind and offshore wind energy fundamentals. This included an overview of how wind turbines work, the different types of wind

technologies in existence and under development, and how the unique requirements of offshore wind turbines differentiate them from their land-based counterparts. Offshore wind turbines require Class 5 winds and are much larger than their land-based turbines; they are a minimum of 1.5 MW and could be much larger if restrictions of overland transport are removed. Also discussed was the rationale for moving wind power offshore, and the benefits and challenges associated with offshore development. Some of the reasons for the interest in moving wind power offshore include the following:

- Windy land is not always near load centers.
- The grid is not set up for long interstate electric transmission.
- Load centers are close to the ocean.

Some of the challenges of U.S. offshore wind project development include:

- No U.S. track record for offshore projects
- Short track record world-wide
- High potential cost of operations and maintenance (O&M)
- Environmental concerns
- 90% of potential U.S. offshore wind sites are in deep water

The presentation concluded with an overview of the status of the U.S. and global wind power industry today, and how it is likely to change in the future. The concluding thoughts shared on where the wind industry is headed include:

- Large, land-based turbines have reached their practical size limit.
- More “plug-and-play” distributed wind turbines should revitalize this sector.
- Offshore will need to first tackle shallow, near-shore applications before developing deep-water projects.
- Unique applications may enter the market: hydrogen, clean water, plug-in hybrids.

George Hagerman delivered the second presentation on the potential energy and economic benefits of offshore wind power for Virginia. He began by outlining how Virginia’s offshore wind energy resource potential is much greater than its land-based potential, noting that the Class 5+ wind areas needed for economical offshore projects are located in Federal waters beyond the 3 nautical mile limit of Virginia state jurisdiction. He also noted some of the unique features that make Virginia a favorable location for offshore wind development, including the following:

- Class 6 wind energy resources are located within 10-15 miles of Virginia’s shoreline and are close to major, growing centers of power demand.
- Virginia has a robust coastal transmission system.

- There is minimal probability of a major hurricane strike (Categories 3 through 5) on Virginia's coastline.

Offshore wind can meet a large portion of Virginia's energy demand. An ocean shelf the size of Virginia Beach with wind turbines installed at a density of 10MW per kilometer could produce enough power to meet 20% of Virginia's annual electricity demand. Furthermore, it was noted that developing this power potential could have significant economic benefits for Virginia, including a new sustainable business value of \$150 - \$200 million per year in the maritime sector alone.

The third presentation, given by George Hagerman, addressed the potential environmental effects of offshore wind power, including visual impacts, potential conflicts with other sea and air space uses, and issues associated with installation and decommissioning. Regarding visual appearance of offshore wind turbines, the degree of visual intrusion on the seascape depends on the offshore distance, the elevation of the shoreline observer, and the coastal weather conditions' impact on visibility. Furthermore, there are some concerns of the visual impacts of mandatory navigational hazard markings; however, such markings would be below the perception threshold of most individuals. Siting wind turbines farther offshore can mitigate visual appearance impacts, as well as avoid migratory shorebird flyways. Detailed analysis is still needed to better understand the impacts of offshore wind power projects on bird populations. In terms of impacts on marine life, studies have shown that submerged structures (such as submarine power cables and anti-scour mats around the base of towers) can provide new habitat for marine life, similar to the artificial reef effect of sunken ships.

Other sea space uses that could potentially conflict with offshore wind power projects include marine protected areas, commercial shipping, commercial fishing, scientific research reserves, military warning areas, telecommunications cable routes, and sand mining and dredge soil disposal sites. Offshore wind turbine/tower installation concerns include fabrication yard compliance with appropriate industry regulations and underwater routing of submarine power cables and shore crossing. Decommissioning concerns include disposition of fixed structures on the seafloor (where removal may cause more damage than leaving in place) and gradual removal if there is evidence that the artificial reef effect has increased carrying capacity of the local marine environment for larger fish populations.

The final presentation was given by Brian Levite, which examined the policy issues associated with offshore wind power development, including an overview of projects currently under development. This began with an overview of some of the drivers of the wind industry today, which include renewable portfolio standards, production tax credits, economies of scale, and high energy costs in competing markets. This was followed by an examination of some of the potential roadblocks for wind development, including transmission access, grid integration issues, environmental issues, radar interference, NIMBY/line of sight issues, material cost increases, and durability and operations and maintenance issues. Specific regulatory issues associated with offshore wind development were also addressed, and include the following:

- Most offshore wind projects are beyond state boarders
- U.S. Minerals Management Service (MMS) regulates projects in Federal waters

- MMS is currently developing guidelines for environmental impact statements for offshore wind projects
- Jurisdictional uncertainties remain

Several efforts are underway that attempt to address some of these issues. The President's Advanced Energy Initiative was noted, which states that "areas with good wind resources have the potential to supply up to 20% of the electricity consumption of the United States." The Massachusetts Technology Collaborative, U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, and GE released *A Framework for Offshore Wind Energy Development in the United States*. The *Framework*, developed in 2005, identifies the technical, environmental, economic and regulatory needs required for the responsible development of our nation's offshore wind energy potential, as well as strategies for addressing them. Also under development is a best practices guide for siting and permitting offshore wind projects, which builds off of lessons learned from the Cape Wind project, and is planned to be integrated with the MMS draft siting rules under development. The presentation concluded with an overview of offshore wind projects under development in the U.S., including Cape Wind in Massachusetts, LIPA Wind Park in New York, and the Galveston Island project in Texas.

III. FACILITATED DISCUSSION

The workshop concluded with a group discussion amongst all workshop participants and was facilitated by Brian Levite. Brian Levite began by stating the purpose and non-purposes of the discussion. The purpose of the discussion was to determine how Virginia can proceed in exploring offshore wind opportunities. The discussion was *not* intended to result in a go/no-go decision on offshore wind for Virginia, nor was it intended to result in a commitment to any specific projects, sites, or technologies.

Several questions were addressed during this discussion, including the following:

- What opportunities do we perceive for wind power in Virginia?
- What are the major perceived barriers for an offshore wind project in Virginia?
- Who are the key players for wind power in Virginia?
- What questions need to be answered to determine if offshore wind power is right for Virginia?

A summary of that discussion is provided below.

What opportunities do we perceive for wind power in Virginia?

- Advantageous electrical location, which provides valuable counter-flow
- Can accommodate load growth/significant percent of energy can be generated

- Emissions avoidance (both criteria emissions and greenhouse gas emissions)
- Huge economic potential - next generation technologies
- Wind manufacturing has been focused on wind-friendly states
- Virginia has basic maritime workforce infrastructure in place
- Opportunity for significant power with limited environmental implications
- Offshore Virginia has greater wind potential than gas

What are the major perceived barriers for an offshore wind project in Virginia?

- Fitting wind infrastructure with existing maritime infrastructure
- Political roadblocks? (Senator Warner)
- Education and engagement, including dispelling misunderstandings about wind power potential
- Issue of offshore royalty sharing
- Perceived impacts on fish and wildlife resources

Who are the key players for wind power in Virginia (need to distinguish between offshore and land-based)?

It was noted that there needed to be a distinction between offshore and land-based stakeholders. The group agreed that Virginia needs greater collaboration on offshore wind energy efforts, such as the development of an informal advisory group. It was also stated that offshore wind concerns must be determined and addressed prior to project proposal. The following key players who should be included in offshore wind discussions were identified:

- Navy & Coast Guard
- All State environmental agencies
- MMS
- National Oceanic and Atmospheric Administration (NOAA), both National Marine Fisheries Service and Coastal Zone Management
- Commercial & sport-fishing interests
- Utilities & PJM
- Virginia Coastal Energy Research Consortium (VCERC)
- NASA Langley Research Center and Wallops Island
- State economic development and commerce agencies
- Federal Aviation Administration
- U.S. Fish and Wildlife Service

- Local governments
- Environmental NGOs
- Virginia Wind Energy Collaborative (VWEC)

What questions need to be answered to determine if offshore wind power is right for Virginia?

- What is view-shed acceptability?
- Need GIS layering of pooled resources
- Holistic economic impact assessment (incorporate environmental implications)
- Document political hurdles
- What do we know about the offshore environment?
 - What species are using the area? How do they move through the area? What resources do they use?
 - What else do we need to know?
- Determine mixed-use approach
- How will Virginia projects fit into coast-wide projects?
- Do we reach out to neighboring states?
- What are the lessons learned from other states?
- How does this fit into overall energy plan/policy?
- What is an appropriate timeframe?

After addressing these four topics of discussion, the conversation concluded with an action planning session. The following action items, responsible parties, and due dates were identified:

Action	Responsible Party	Due Date
Incorporate an offshore wind focus into Virginia Energy Plan	Virginia Energy Plan Advisory Board	June 30, 2007
Evaluate upcoming offshore Federal funding opportunities	George Hagerman	December 1, 2006
Identify a state champion for offshore wind (Congressional delegate)	SAIC	December 1, 2006
Develop summary report of this working group meeting	SENTECH, Inc.	End of October 2006

The workshop concluded with the participants briefly stating their final thoughts on the direction that offshore wind development could take in Virginia.

APPENDIX A: PARTICIPANT LIST

NAME	ORGANIZATION	EMAIL
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APPENDIX B: WORKSHHP AGENDA



EXPLORING OFFSHORE WIND POWER FOR VIRGINIA

A Pre-Conference Workshop of Energy Virginia 2006

Monday, 2:00 PM until 6:30 PM, October 16th

Preston Library, Turman Room, VMI Post

Hosted by the Virginia Military Institute and VMI Research Laboratories, Inc.

AGENDA

2:00 – 2:15 PM	Welcome and Introductions <i>Neil Rondorf, SAIC</i>
2:15 – 2:35 PM	Offshore Wind Power 101 <i>Brian Levite, SENTECH, Inc.</i>
2:35 – 2:45 PM	Q&A
2:45 – 3:05 PM	Potential Energy and Economic Benefits for Virginia <i>George Hagerman, Virginia Tech</i>
3:05 – 3:15 PM	Q&A
3:15 – 3:30 PM	Break
3:30 – 3:50 PM	Potential Environmental Effects <i>George Hagerman, Virginia Tech</i>
3:50 – 4:00 PM	Q&A
4:00 – 4:20 PM	Federal and State Regulatory Issues <i>Brian Levite, SENTECH, Inc.</i>
4:20 – 4:30 PM	Q&A
4:30 – 5:30 PM	Discussion involving all stakeholder perspectives: <ul style="list-style-type: none"> • Biggest hopes, biggest fears? • What research questions do you think should be answered to better inform further exploration of offshore wind power for Virginia? • What and how would each participant like to contribute towards further exploration of this resource?
5:30 – 6:30 PM	Informal reception hosted by SAIC in the Moody Hall Lounge

APPENDIX C: ABOUT THE PRESENTERS

George Hagerman has over 25 years experience evaluating and optimizing the design, performance, and economics of marine renewable energy systems, including offshore wind power, wave power, tidal power, and ocean thermal energy conversion (OTEC). He is a research faculty member at the Virginia Tech Advanced Research Institute in Arlington.

Recent and ongoing ocean energy projects include evaluation of coastal wind data on Virginia's Eastern Shore, a preliminary assessment of the wave energy resource potential off southern New England, and development of a submerged buoy that harvests wave energy for powering underwater sensor grids and ocean observatories. In addition, under the Electric Power Research Institute's North American offshore wave energy and tidal stream energy demonstration programs, Mr. Hagerman is responsible for resource assessment, site characterizations, and environmental issue identification in six states and two Canadian provinces. Finally, in supporting the creation of the Virginia Coastal Energy Research Consortium, he has made preliminary estimates of the potential energy and economic benefits of offshore wind power development in Virginia.

Brian Levite is an energy policy analyst with seven years of experience designing and implementing energy efficiency and renewable energy programs. He is a Project Manager with SENTECH, Inc., an energy consulting firm based in Bethesda, MD. Mr. Levite leads SENTECH's work for the U.S. Department of Energy's Wind Technology Program and is supporting various state wind power development efforts. He has a Bachelors degree in Environmental Policy and a Masters degree in Public Policy from American University. Beyond his support of wind power programs, Mr. Levite has had extensive experience in the area of energy efficiency programs, policy analysis, and market transformation efforts.