# Center for Wind Energy at James Madison University

Virginia Wind Workshop Jonathan J. Miles, Ph.D. 9<sup>th</sup> March 2015



#### **FOCUS AREAS**

### RESEARCH, EDUCATION, & OUTREACH









Resource assessment, data analysis, modeling, visual simulations, technology testing Installer training, K12 curriculum development, classroom education, teacher training

Community events, county planning assistance, tours, presentations, fact sheets

## FACILITIES, RESOURCES, & CAPABILITIES

Facility	Location	Resources	Capabilities
Office Suite and High Bay Space	1401 Technology Drive, Suite 120	<ul> <li>Wind turbine displays</li> <li>Russell's Technical Products environmental chamber</li> <li>K.H. Steuernagel Solar Simulation System</li> <li>Meteorological equipment         <ul> <li>Meteorlogical towers &amp; instrumentation</li> <li>&gt; 50-m (4), 34-m (2), 20-m (6) systems</li> <li>Anemometers and wind vanes</li> <li>Data loggers</li> </ul> </li> <li>Windographer, WindFarmer, WaSP, and ESRI ArcGIS software</li> <li>Outreach materials</li> <li>Classroom Kit Lending Library</li> </ul>	<ul> <li>Conduct teaching, training, research, and development in a ~4000-ft<sup>2</sup> high bay lab space</li> <li>Provide tours to JMU and outside companies/organizations</li> </ul>
Small Wind Training and Testing Facility	East Campus, across from Rose Library	<ul> <li>Safety equipment</li> <li>WeatherBug System</li> <li>Meteorological instruments <ul> <li>Suite of 6 anemometers, 4 wind vanes, and 2 3D sonic sensors installed at three elevations coupled with DAQ system</li> </ul> </li> <li>WeatherBug Professional weather station</li> <li>ASC and SecondWind SODAR units</li> <li>7.5-kW Bergey XL-R turbine</li> <li>11-kW Gaia wind turbine (to be installed)</li> <li>SWP SkyStream 3.7 2.4-kW turbine on 45' tilt-up tower</li> <li>SWP SkyStream 3.7 2.4-kW turbine on 70' tilt-up tower</li> </ul>	<ul> <li>Robust monitoring and wind assessment</li> <li>Provides a resource unique to the region</li> <li>Train future workforce for small wind industry</li> <li>Turbine testing programs in development and led by interdisciplinary student team with faculty supervision</li> <li>Provides hands-on, experiential curriculum for all education levels (K-12, 2-yr, 4-yr)</li> <li>Engages professionals who seek to enter the wind energy field</li> <li>Power performance verification, prototype "shakedown" testing, research &amp; improvements on existing technologies</li> </ul>
Wind Lab	ISAT/CS 131	<ul> <li>Lotus Innovative Solutions Turbine Trainer</li> <li>Array of infrared imaging and detection equipment</li> <li>Windographer, WindFarmer, WaSP, and ESRI ArcGIS software</li> <li>ISAT thesis archive</li> </ul>	<ul> <li>Train students on the components and operations of a wind turbine</li> <li>Teach basic electro-mechanical aspects of automation and controls, signals &amp; analysis, systems integration, SCADA, etc.</li> <li>Wind resource analysis</li> </ul>



















#### PROGRAMS OFFERED BY THE VIRGINIA CENTER FOR WIND ENERGY

The *State Based Anemometer Loan Program* is designed to empower landowners by increasing their awareness and interest in wind energy by loaning them meteorological towers and promoting wind assessment. The program:

- Loans meteorological towers and measurement instruments at no cost (20-m, 34-m, and 50-m towers)
- Identifies obstacles to wind development
- Classifies available wind
   resource on site
- Conducts site assessments for feasibility of installation



The *Small Wind Training and Testing Facility* serves a variety of purposes and addresses a range of needs associated with the development of a small wind workforce in Virginia. The SWTTF supports:

- Training for K-16 education
- Tours for the general public
- Independent testing to characterize and field-test new technologies and attract small wind manufacturing to Virginia
- Installer education center to assist in establishing and developing an installer base (wind and solar)







The Virginia Wind Energy Collaborative provides a forum for collaboration among stakeholders, organizations, and the general public interested in the benefits and opportunities associated with wind power development. We conduct outreach by:

- Hosting and attending wind industry conferences and events
- Offering an online resource portal that includes GIS mapping tools
- Providing information upon request (e.g. speaking events and factsheets)
- Facilitates collaboration of the VA Wind Working Group
- Aiding county planners in siting renewable energy projects and ordinance development





*Virginia Wind for Schools* is part of the DOE-funded national program that aims to raise awareness



about the benefits of wind energy while also developing a wind energy knowledge base among future leaders of our communities, states, and nation. Program features include:

- Host Schools can acquire a small wind turbine for their school
- Partner Schools can acquire a MET tower to measure the wind
- Teachers are trained on wind energy curricula
- Students can participate in the KidWind Challenge
- Classroom and JMU visits to learn about wind energy



# **Research Opportunities**

- Undergraduate
  - Internships
  - GIS mapserver
  - Small Wind Training & Testing Facility Development
- Graduate
  - Internships
  - Wind for Schools Best Practices Manual
  - Strategy for LiDAR Deployment Offshore
- Sponsored Research (grant funded)
  - Chesapeake Bay Foundation
  - Jobs and Economic Development Impact Model
  - Tangier Island Community Wind Development
  - Coastal Wind Characterization with Advanced Modeling and Data Visualization







## Resources

#### • Online tools

- Landscape Classification System
- Virginia Renewable Siting Scoring System (VRS3)
- NextStep
- <u>http://wind.jmu.edu/vwec/tools.html</u>
- Offshore data viewer
  - <u>http://vcwe.jmu.edu/mapdataviewer/</u>
- Education site
  - <u>http://wind.jmu.edu/education/</u>
- Links & Factsheets
  - AWEA/DWEA
  - NREL
  - DOE
  - <u>http://wind.jmu.edu/vwec/info.html</u>



NextStep is an online calculator for residential, commercial, and agricultural landowners to use as a site feasibility tool. It is designed as a prescreening tool to provide an *estimate* for property owners that enables them to access technical and economic considerations before engaging in costly and time consuming site characterization and analysis.

### **FEDERAL & STATE ENGAGEMENT**

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- (2008) ARRA wind rebate and grant programs are initiated



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- (2014) VOWTAP is one of three projects down-selected by DOE to advance



#### Development is ongoing, but . .







#### Deployment in 2050: Wind in 50 States (Land and Offshore)



Energy Efficiency & Renewable Energy



# Questions?

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www.windpowerVA.org www.offshorewindVA.org



Visit our Facebook Page to ask questions, give feedback, see current events and project photos, and stay up-to-date on what's happening at the Center and with wind energy throughout Virginia!



Join our LinkedIn Group to engage in discussions, participate in polls, read current articles, and ask questions!



Skype us via VACenterforWindEnergy to ask questions or just chat with us!