

Where the wind blows

Computerized map, landscape classifier pinpoint potential wind farm sites

By Eric Gorton

A whistling wind whips the flags straight out, adding a biting chill to an already cool spring day. It seems to be a typical condition atop the hill that is home to James Madison University's East Campus, but wind surveys paint a different picture.

Dr. Jonathan Miles, professor of integrated science and technology at JMU and a founder of the Virginia Wind Energy Collaborative, says wind conditions on the hill are very poor — at least in terms of being able to generate electric power.

Turbines that produce electricity for utility-scale power plants require an average annual wind speed greater than 13 miles per hour. JMU's hill generates less than half that — still good enough, though, with some help from solar panels, to maintain the charge on a battery bank used to power a weather station that transmits data back to the ISAT building. The batteries also will soon charge lights that will be mounted on JMU's own wind-turbine tower, which was installed on campus in October 2004.

Virginia does, however, have locales with suitable wind speeds for utility-scale wind farms, especially on the mountain ridges along the Virginia/West Virginia border and along the Atlantic coastline and Chesapeake Bay areas, Miles says. It's that potential that led the VWEC, a working group of environmental scientists and other wind-use advocates, to create a computerized map and accompanying landscape classification system to assist in locating potential wind farms for the commonwealth.



The wind turbine on the East Campus can generate enough electricity, with some help from solar panels, to power a weather station that transmits data back to the ISAT building.

Using data from the Virginia wind resources map and a host of state and federal agencies, the map and landscape classification document identify areas both suitable and unsuitable for wind-farm development. On the map, areas with sufficient wind conditions for utility-scale wind farms show up in orange.

The wind, however, is only part of the equation for finding suitable wind-farm sites. Other factors — terrain, wildlife habitats, land ownership and land-use regulations among them — are equally important to address. So, with a couple of mouse clicks, more colors appear on the map, revealing areas of environmental sensitivity; for instance, a red line indicates the path of the Appalachian Trail. A light-blue area surrounding the AT represents its five-mile buffer zone, an area off-limits to wind farms though it runs through some of the best areas for wind in western Virginia.

With a few more clicks, the map can show the state's highway system, U.S. parklands, U.S. and Virginia forests and other areas either unsuitable for wind farms or where special provisions must be considered.

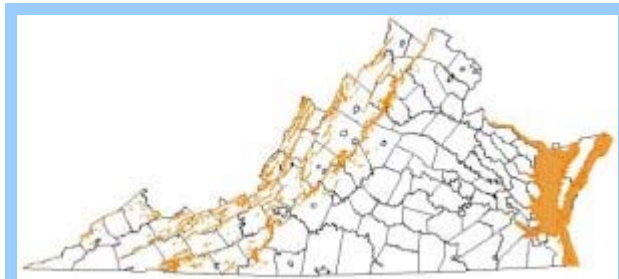
The landscape classification document defines the various layers that can be shown on the map and provides a directory for those who contributed data. The layers are broken down into three main categories: Unsuitable, flagged for potential use conflict and unclassified.

Legal or regulatory restrictions account for most of the areas deemed "unsuitable," such as the Appalachian Trail and its five-mile buffer zone. Other areas rated unsuitable include the Blue Ridge Parkway, Shenandoah National Park and U.S. Forest Service Wilderness and National Scenic areas.

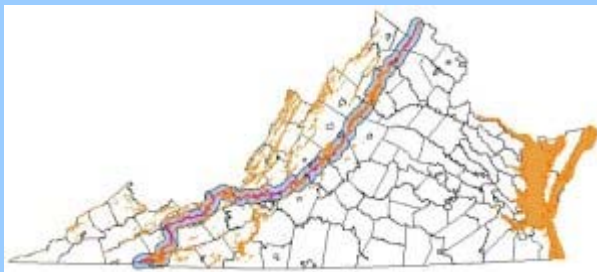
Areas "flagged for potential conflict" include a five- to 10-mile buffer zone around the AT, some Nature Conservancy sites, Virginia natural heritage sites and uninventoried roadless areas on U.S. forest land.

"Unclassified" areas are those with insufficient wind for utility-scale wind farms, or else, where insufficient data exists to assess suitability.

Why Use Wind?



The Virginia Wind Resources Map. Orange indicates areas with suitable average annual wind speed for utility-scale wind farms. [Click](#) to see full size.



With a few mouse clicks, the map can show the Appalachian Trail (red line) and a five-mile buffer zone where regulations prohibit wind farm construction. [Click](#) to see full size.

"Of the many sources of renewable energy, wind is now the least expensive to produce and the most abundant, with the potential to supply a significant portion of the electricity demand in the United States," states VWEC's landscape document.

Another benefit is the tax revenue produced by utility-scale wind farms for localities. Estimates for a planned wind farm in Highland County (located southwest of Rockingham County) predict the West Virginia-bordering county could earn \$250,000 a year in tax revenues.

Generating electricity without pollution is the obvious advantage wind has over fossil-fueled power plants, but wind farms do affect the environment. Wind turbines can reach 400 feet in height and thus become prominent features of the landscape; roads are required to get to them; they can lead to forest fragmentation; and they can affect wildlife habitats.

In many instances, Miles says, locating a wind farm becomes a political issue: "Is it good for the community? Some people like the way they look and some do not. Some people worry about property values."

The proposed Highland County wind farm would put 18 to 20 turbines, each 400 feet in height, on a mountaintop clearing near the Virginia/West Virginia line. The proposal drew an abundance of opposition this summer during lengthy public hearings, with concerns ranging from the appearance of the turbines to their effect on an endangered bat species that may inhabit the area. Lawsuits were threatened once the county board of supervisors approved a permit for the wind farm in July.

A common argument against generating electricity with wind is that it can't replace coal and other fossil fuels. Wind-use advocate Miles calls it a hollow claim. Wind, he says, "is not the solution, it's a piece of the solution." Much more needs to be done to improve energy efficiency in cars, in buildings and in research into developing other clean energy sources. "Wind can be a significant piece of that portfolio," said Miles. The adverse effects of coal and other fossil fuels on the environment, such as acid rain and smog, are far more detrimental, he adds.

The collaborative, Miles says, is an advocate of responsible wind-energy development and does not take positions on specific projects. "Our mission in life is to educate and inform," he said. He hopes the map and landscape classification system show a good-faith effort in evaluating possible wind-farm sites and will give a boost to the wind industry in Virginia.

Don Giecek, a 1987 JMU graduate who helped develop the map and landscape classification system, said the two tools provide "a smart-growth exercise for the entire state of Virginia." Not only does the map show potential areas for wind farms, it identifies the premier natural areas of the state to avoid.

Giecek said the tools are a credit to numerous groups and agencies that worked together — something they don't always do — to put them together. "We have developed something beneficial," he said.

Available to the public

The map and an accompanying landscape classification document are available to the public at: http://vwec.cisat.jmu.edu/gis_lcs.htm . The two resources are maintained by VWEC, which Miles helped start in 2002 to promote the development and use of wind energy in Virginia. Grants from the U.S. Department of Energy have funded work leading to creation of the map and the document.

Miles also has plans to show the map around the state, in areas with potential for developing wind farms. The goal is to make a dozen stops over two years and to make three presentations at each stop: one geared toward government officials, another for the public and a third designed for schools. A fourth presentation could be added for the agricultural community.

While the map and the land classification system are designed for Virginia, Miles says other states are showing interest in them

http://www.jmu.edu/madison scholar/wm_preview/feature005.shtml

Wind Row

By Jon Miles

Guest Column/Richmond Times-Dispatch
August 14, 2005

Wind power and the prospect of utility-scale wind farms in Virginia have become increasingly controversial issues in recent months, especially surrounding a recent vote of the Highland County Board of Supervisors to approve the McBride wind project, placing 19 turbines on mountain ridges. The contentious debate about this technology and this particular project, both among the public and in the press, has, unfortunately, often been characterized by familiar alarmist distortions concerning the wind industry in general and the motives and methods of its proponents. — [Read more.](#)