Sustainability Proposal:

Wind Energy: An Educational Tool for Ohio Wesleyan?

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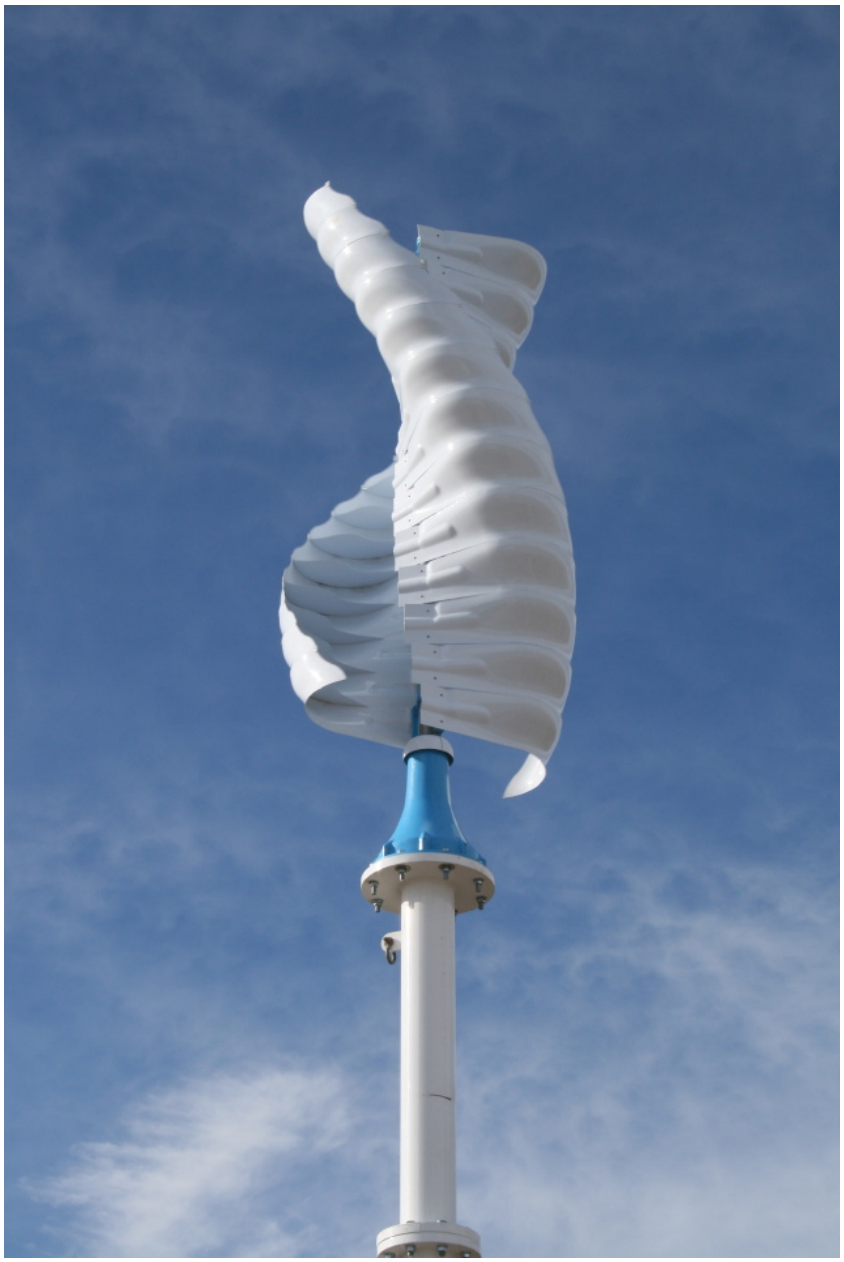


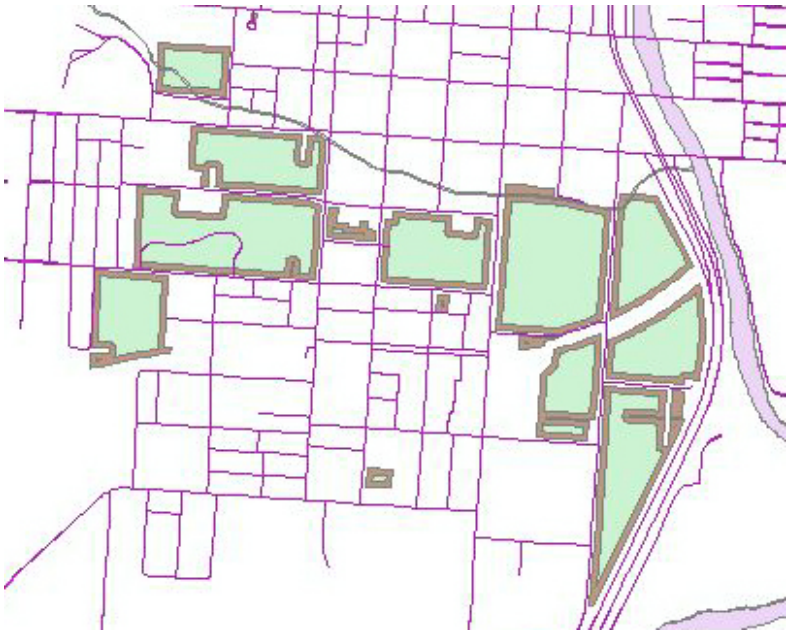
We propose seeking funding for, purchasing, and installing a pedagogically oriented wind turbine on the OWU campus. The turbine would provide real-time data (weather, energy generated, etc.) to be monitored and analyzed by students and faculty. This proposal examines possible locations for a turbine on campus, the environmental impact of a turbine, and sources for funding.

The Setting

OWU is progressive in many ways: there are multiple student groups on campus promoting environmental activism, equality, and peace; students are encouraged to speak their minds and express differences; and students from multiple countries add to the school's appeal. However, this progressiveness does not extend to the realm of alternative energy beyond a few examples. For example, while the school recently built a new Natatorium that uses geothermal energy, the concept of converting the earth's energy to heat is not exactly obvious to the casual campus visitor or student**.** As the United States wishes to advance into an era where fossil fuel consumption is reduced and alternative energy production increased, spreading knowledge about these alternative energies is paramount.

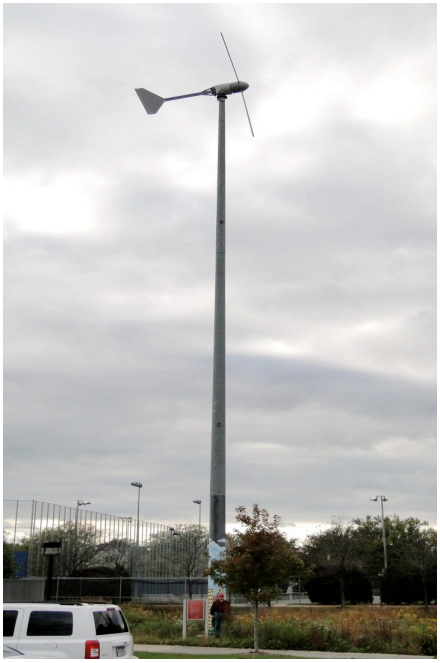
A wind turbine would be a significant step for OWU in terms of education about alternative energy. A wind turbine on campus would serve as a pedagogical tool (much like our scanning electron microscope) and laboratory for students from diverse majors. A wind turbine on campus would also be a highly visible symbol of Ohio Wesleyan's commitment to a sustainable future and alternative energy.

Locating a Wind Turbine on the OWU Campus



Perhaps the most pertinent question is where to put a turbine on campus? Delaware County zoning laws must be considered: no tower/turbine may be taller than the distance of the base of the turbine to the property line. With this in mind, a map was made with ArcGIS to show property boundaries for OWU with a 50' buffer (dark olive green). The map shows possible locations for a 50' tall wind turbine. Such a turbine could be placed just about anywhere on campus, possibly a highly visible location near the Hamilton Williams campus center, or on the east end of campus, near the Science Center (and visible from Hwy 23).

Potential Impact of a Wind Turbine on the OWU Campus



Wind turbines are frequently denounced for their appearance and potential for generating noise. However, there is a new generation of turbines that are not only aesthetically pleasing, but virtually silent: the turbines documented in this proposal all have these characteristics. Some of these turbines do not have blades that protrude directly out; rather, they curl around the tower. The blades match the speed of the wind, causing little noise. A turbine visited in St. Paul, Minnesota at Macalester College (image to the right) was a traditional turbine design, yet even on a windy day the turbine was barely audible. Additionally, many of these turbines claim to have decibel levels lower than that of street traffic.

The issue of birds flying into the turbine blades is also raised in objection to wind turbines, but newer turbines have been designed to minimize bird collisions. Helix Wind and Quietrevolution, two companies specializing in small-scale, aesthetically pleasing turbines, tout their turbines' ability to spare the lives of birds[1]. Both companies claim few deaths (if any) have occurred. The main advocates for saving birds lives from wind turbines cite the Altamount Pass as an example of the threat turbines pose. However, the study is outdated - it is nearly 30 years old - and many other studies have deemed that bird deaths from other man-made structures (such as windows) are far more significant than wind turbines[2]. Also, drawing from a report done by the U.S. Fish and Wildlife Service, the majority of bird fatalities in the United States come from domestic and feral cats. In fact, they estimate more deaths come from window collisions than wind turbines[3].

The pedagogical importance of a wind turbine on campus will most likely outweigh its sonic or detrimental environmental impacts. A school in Wisconsin, Gateway Technical College, uses its Windspire turbine as a pedagogical tool. Using computer software, students monitor the turbine's energy output for engineering programs[4]. Ideally, if a turbine were installed, remote-monitoring systems could be installed on campus to show the relationship between wind speed and energy production. One such location could be in Hamilton Williams Campus Center, where a display allowed students and visitors to view up-to-the-minute data on the energy being generated. A more sophisticated analytical monitoring system could be established in the Science Center, allowing students and faculty to monitor and experiment with the turbine. Such a system

would be of interest to students and faculty in Environmental Studies, Geography, Geology, Physics, Computer Science, etc.

The energy created by the turbine is not where the value lies. Rather, spreading understanding of alternative energy methods is the goal. As a preface to a proposal for a wind turbine on campus, it would be advantageous to survey faculty, staff, students, and adjacent community members regarding the installation of a wind turbine on campus. Sam Mulkerin, in a 2010 survey of OWU students found that a significant majority of students were in favor of implementing renewable energy on campus and had a very positive attitude about the potential for installing wind turbines on campus[5].

Finally, a wind turbine or turbines on campus could serve as a significant, visual symbol of Ohio Wesleyan's commitment to environmental sustainability and alternative energy sources. At a 2010 meeting of the OWU Sustainability Task Force, Chris Setzer (head of campus Buildings and Grounds) indicated an interest in assisting in the funding of a highly visible, symbolic, and pedagogical project on campus with a focus on sustainability and alternative energy sources. Wind turbines on campus would certainly fulfill that role. OWU is not alone in its ambitions: in 2009, a student at Baldwin-Wallace College in Berea, Ohio, pursued a similar project which yielded the construction of a turbine, as well as the addition of a new major: Sustainability[6].

Funding a Wind Turbine on the OWU Campus

The price for a turbine of moderate size is actually quite reasonable. Most of the turbines researched were under $50,000. Even those with monitoring systems were fairly priced: a company which seems particularly viable - Helix Wind - offers small-scale turbines (3,000 kWh/year) for around $10,000 - $15,000[7]. Even with the monitoring system added in, plus installation, the total cost would be less than $20,000. Other similar turbines are as cheap as $6,500, such as the Windtronics Wind Turbine[8]. Additionally, this turbine comes with a remote monitoring system, viewable on a computer monitor. Turbines like these seem to be the most viable for a project such as this.

Recommendation

A typical installation time, including delivery time, seems to be about a month. A turbine closer to one hundred feet tall or smaller would be feasible, and would fit within the Delaware zoning laws. The most realistic size turbine would be up to 100 feet tall. The Macalester College wind turbine is around 100 feet

tall and cost around $50,000[9]. This turbine would be a good option in terms of a traditional turbine. It produces around 10,000 kWh per year. However, there was no visible monitoring system, which is a vital part of this project.

One feasible option would utilize a Californian company called Helix Wind. It specializes in small-scale turbines with monitoring systems. Helix Wind has four options of turbines that all come with monitoring systems. An example of the Helix turbine can be seen to the right. The monitoring system is impressive: it has a web-based interface that allows users to monitor wind speed and energy production. A system like this could be placed inside a campus building with a monitor permanently showing the energy production, allowing students to see a correlation between weather and energy production[10].

One 2.5 kWh turbine from Helix costs about $15,000 (installation included). However, costs such as the remote monitoring system will add $1,500 to the cost. To ensure the remote monitoring system works properly, power systems would have to be installed. Even with these extra costs added in, the total cost would still be around $20,000[11].

Another feasible turbine option comes from a company called Windspire. The Reno, NV based company builds turbines standing a mere thirty feet tall and have had no reports of bird deaths, due to the tower's unique design. A case study of Gateway Technical College in Kenosha, Wisconsin, reports that a Windspire turbine was installed and has been used as a pedagogical tool.

Finally, the Windtronics wind turbine is a final option. These turbines are not as aesthetically pleasing as the Helix Wind and Windspire turbines, but they are inexpensive and have an excellent remote monitoring system. This would be an excellent choice in that the monitoring system is easily decipherable and would reach a broad range of people[12].

Notes

[1] quietrevolution FAQ: http://www.quietrevolution.com/faqs-technical.htm, Helix Wind FAQ: http://www.helixwind.com/en/faq.php#faq-59
[2] Mother Nature Network: http://www.mnn.com/earth-matters/energy/stories/do-wind-turbines-cause-bird-fatalities
[3] U.S. Fish and Wildlife Service: http://www.fws.gov/birds/mortality-fact-sheet.pdf
[4] Windspire – Gateway Technical College Wind Turbine: http://windspireenergy.com/news/campus-wind-power-teaches-about-alternative-energy/
[5] Mulkerin, Sam, "Renewable Energy at OWU": http://go.owu.edu/~jbkrygie/course/OWU_Green_F2010.pdf
[6] Dumond, Joanne Berger, Baldwin-Wallace practices what it teaches in new major with wind turbine": http://blog.cleveland.com/newssun/2009/12/baldwin-wallace_practices_what.html
[7] Helix Wind: http://www.helixwind.com/en/product.php
[8] Nusca, Andrew, "With gearless Honeywell turbine, Windtronics ushers in urban wind power," http://www.smartplanet.com/blog/smart-takes/with-gearless-honeywell-turbine-windtronics-ushers-in-urban-wind-power/6529
[9] Macalester Wind turbine – pricing: http://www.macalester.edu/sustainability/data/windturbine.html
[10] Helix Wind Turbine and Monitoring System to Power Groundbreaking "Zero Energy" House, http://www.helixwind.com/en/newsDetail.php?nid=71
[11] Helix Wind Products: http://www.helixwind.com/en/product.php
[12] Windtronics – Remote Monitoring: http://www.windtronics.com/remote-monitoring