Update on offshore wind

As posted on CleanTechBlog.com

In Cleveland, the Great Lakes Energy Development Task Force (a collaboration involving many local public, private and academic organizations, led by the Cuyahoga County government) has commissioned a feasibility study for developing the Great Lakes Wind Energy Center (GLWEC). The GLWEC would include a demonstration offshore project in Lake Erie off of downtown Cleveland, along with an applied research center to facilitate the development of lower-cost, next-generation offshore wind energy technologies and approaches.

The long-term market opportunity for offshore wind just in the Great Lakes – much less the oceans of the world – is huge. A 2004 study indicated a theoretical potential for almost 250 gigawatts (250,000 megawatts!) of wind installations in the Great Lakes, and the Land Policy Institute at Michigan State University recently released a report indicating 322 gigawatts of potential in the waters offshore the state of Michigan alone.

Of course, nowhere near this much offshore wind generating capacity is likely to be installed, but even if 50 gigawatts is installed in the coming decades, at $4 million per megawatt, this would represent $200 billion of investment in the Great Lakes. That seems worth pursuing with some vigor.

As a member of the task force, I recently traveled to Hamburg, Germany, to present the state of progress in developing the GLWEC at Germanischer Lloyd's annual offshore wind workshop. This gave me an opportunity to "take the pulse" of how the wind industry was currently assessing prospects for offshore wind.

The general state of affairs is that the wind industry is too preoccupied with prospects in onshore markets around the world to pay much more than tangential attention to offshore opportunities. For

instance, according to the 2007 Report of the Global Wind Energy Council, 20,076 megawatts of wind energy was installed worldwide in 2007, but according to statistics from the European Wind Energy Association, only 210 megawatts was installed offshore (all in Europe). With only 1 percent of the market, it's easy to see how much a runt offshore wind remains in the overall wind industry.

A key theme of the discussions was the need to maximize reliability/availability/lifetime of offshore turbine designs to minimize overall life-cycle costs of offshore wind energy, given the costs and challenges associated with installation and servicing turbines on top of tall towers in the middle of large bodies of water often exposed to heavy seas and weather.

The wind industry appears to be realizing how naive it was in thinking it would be relatively straightforward to move from onshore to offshore, while simultaneously seeing that offshore wind market needs are rapidly approaching because onshore wind prospects will not be sufficient to meet overall demands for new wind energy installations. In other words, the wind industry is likely to become more serious and earnest in taking head-on the offshore promise and challenge in the relatively near future. Industry leaders can't avoid it forever. But, in the main, they are avoiding it for now.

In the meantime, I am aware of several entrepreneurial companies – some of whom are working in stealth mode, some of them with substantial wherewithal – that are following Clayton Christensen's "Innovator's Dilemma" playbook and aggressively developing innovations to take on a market niche that the "big boys" aren't terribly interested in right now. As a result, the current leaders of the wind industry – Vestas, General Electric, Siemens, Gamesa, Suzlon and so on – may wake up in a few years and find that they "missed the boat" in offshore wind.

This entry was posted on Monday, October 13th, 2008 at 3:09 pm and is filed under Advanced Energy. You can follow any responses to this entry through the RSS 2.0 feed. You can leave a response, or trackback from your own site.

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Mission Statement

To foster strong neighborhoods, support safe, decent and affordable housing, and promote economically sound communities through programs that address issues vital to local business growth and enhanced employment opportunities within Cuyahoga County.

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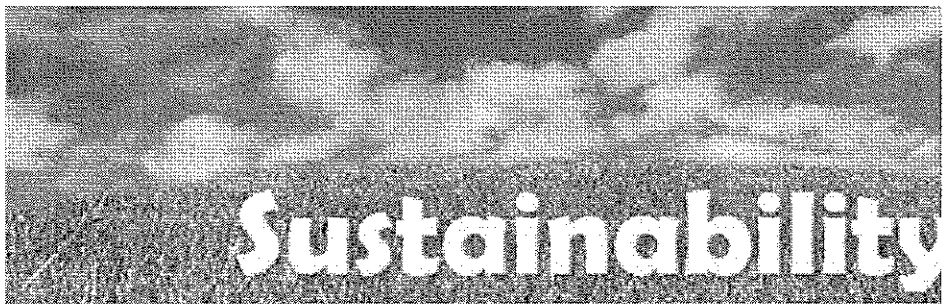
Great Lakes Energy Development Task Force



Energy Development News

- 11September 2008 ETF Meeting - *9/11/2008*
- 14 August ETF Meeting - *8/14/2008*
- 8 July 2008 ETF Meeting - *7/10/2008*
- 12 June 2008 ETF Meeting - *6/12/2008*
- 08 May 2008 ETF Meeting - *5/8/2008*

Featured Items

- 2007 Energy Task Fc
- Lake Erie Wind Resc
- Wind Energy Video

Mission: To promote Advanced Energy in our region for the purpose of:

- Economic development, by stimulating job creation through new research manufacturing opportunities
- Reducing economic exposures associated with fossil fuel use, by accelera of alternative energy sources for local consumers
- Environmental improvement by reducing air emissions associated with fos consumption and thereby improve regional air quality
- National recognition, becoming a leader in Advanced Energy technology c and implementation

Please mark your calendars:
The October meeting of the Great Lakes Energy Development Task Force will be held October 9th at 12:00 p.m. at the law offices of Thompson Hine LLC, 3900 Key Center, Square. Lunch will be provided, but you must RSVP as soon as possible so we have a attendance numbers for the caterers and enough seats for the meeting. This is very in

Task Force

In August 2006, the Cuyahoga County Commissioners created the Great Lakes Energ Task Force ("Task Force") to explore the legal, technical, environmental, economic, an aspects of developing and implementing advanced energy technologies in Cuyahoga (Force was launched to respond to volatile world markets for fossil fuel based energy, a Clean Air Non-Attainment Status, and capture the growing economic development pote and renewable industries.

The Cuyahoga County Department of Development operates as the fiscal agent for the coordinates the enconomic development leads that are generated through the Task Fc

The goal of Task Force is to research and develop an approach for incorporating adva critical component of the Region's energy portfolio and economic development profile. and more generally, is the primary focus of the Task Force.

Great Lakes Energy Development Task Force Recommends a Feasibility Study fc wind energy research/development center

Beyond wind energy, the Task Force recognizes the economic and environmental opp presented by other advanced energy technologies. These technologies include, but ar solar power, bio-fuels such as ethanol, electricity generated from surplus heat or steam efficiency technologies such as LED lighting, and fuel cells. Opportunities for economic environmental improvement associated with these technologies are also being investig Force.

Chaired by County Prosecutor William D. Mason, the Task Force is comprised of a net individuals and organizations structured to involve citizens, governments, for-profit, an sectors of the community.

Members & Committees

The Task Force is led by an Executive Committee, and encompasses the following su

- Policy Subcommittee, chaired by Paul Oyaski
- Energy Sustainability Subcommittee, chaired by Andrew Watterson
- Finance & Development Subcommittee, chaired by Bill Mason
- Research & Development Subcommittee, chaired by Dave Matthiesen
- Economic Impact Subcommittee, chaired by Ed Weston
- External Outreach Subcommittee, chaired by Richard Stuebi

The Task Force meets on the second Thursday of each month to discuss findings of it review other developments from the preceding month, and plan upcoming activities to opportunities associated with advanced energy that will enhance the Region's econom security, and technological prominence. Based on its findings, the Task Force makes r to the County Commissioners and the broader community for implementation.

Task Force meetings are open to the public, and interested parties are welcome to att request that you reserve a place at these meetings since seating is limited. Contact M the date, time, and location of the next Task Force Meeting.

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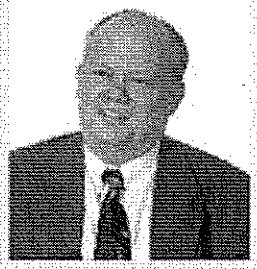
Board of County Commissioners
DEPARTMENT OF
Development

Mission Statement

To foster strong neighborhoods, support safe, decent and affordable housing, and promote economically sound communities through programs that address issues vital to local business growth and enhanced employment opportunities within Cuyahoga County.

Great Lakes Wind Energy Center Feasibility Study



Wind Energy History

From 1974 to 1981, NASA's Glenn Research Center in Cleveland, Ohio, led the U.S. Wind Energy Program for large horizontal-axis wind turbines -- the most popular systems used today.

Feasibility Study

In early 2008, the Cuyahoga County Board of County Commissioners approved a $1,0 with JW Great Lakes Wind, LLC (JWGL) to examine the legal, technical, environmenta financial aspects of developing a Great Lakes Wind Energy Center.

The Center is envisioned to include both an off-shore wind energy generating demonst several turbines in Lake Erie to produce 5-20 megawatts, as well as a research center development and monitoring of new wind technologies and designs optimized for the c offshore applications.

The feasibility study will recommend whether or not to proceed with the development o Wind Energy Center – and if so, how to fund and implement its development. The stud conceptual design for the offshore turbines, including the technical function and scope feasibility study is expected to be completed by the second quarter of 2009.

Initial Feasibility Study Findings:

JWGL has assembled a team of world-class consultants to examine the geological, ec legal, social and financial feasibility of installing wind turbines in Lake Erie and develop applied research and development center.

Cuyahoga County in association with the Great Lakes Energy Development Task Forc release initial findings from the ongoing feasibility study. Reports will be posted here a finalized. Please note, the initial findings in each report impact the final feasibility study conclusions drawn from a single report are strictly preliminary. A final Feasibility Study available in spring 2009.

Wind Resource Assessment Report – Part 1
The Wind Resource Assessment is just one of several studies within the Great Lakes \ Center Feasibility Study. This report contains findings from the first part of a two-part w study. Part two will be complete in December 2008. Conclusions drawn from a single r preliminary. Please direct questions regarding the Great Lakes Wind Energy Center Fe Ryan Miday at p4rm1@cuyahogacounty.us or (216) 299-9326.

Geological and Geotechnical Desktop Study
The Geological and Geotechnical Desktop Study is just one of several studies within th Wind Energy Center Feasibility Study. Conclusions drawn from a single report are stric Please direct questions regarding the Great Lakes Wind Energy Center Feasibility Stu at p4rm1@cuyahogacounty.us or (216) 299-9326.

Ecological Desktop Study
The Ecological Desktop Study is just one of several studies within the Great Lakes Wir

Feasibility Study. Conclusions drawn from a single report are strictly preliminary. Pleas regarding the Great Lakes Wind Energy Center Feasibility Study to Ryan Miday at p4rm1@cuyahogacounty.us or (216) 299-9326.

More information about the Great Lakes Wind Energy Center Feasibility Study:
Q&A: Great Lakes Wind Energy Center Feasibility Study

Department of Development
112 Hamilton Avenue
4th Floor
Cleveland, Ohio 44114
216-443-7260

LAKE ERIE WIND RESOURCE ASSESSMENT: RESULTS FROM THE CLEVELAND WATER INTAKE CRIB

Cuyahoga County, Ohio

Wind Resource Summary Report for the Two-Year Period Between October 1st 2005 and September 30th 2007

Submitted as part of the Great Lakes Wind Energy Center Feasibility Study to:

Cuyahoga County

Great Lakes Energy Development Task Force Executive Committee

Peter K. Endres and Christof van den Bruck
JW Great Lakes Wind
Tower Press Building
1900 Superior Avenue, Suite 333
Cleveland, OH 44114-4420
Office: 216.344.9305

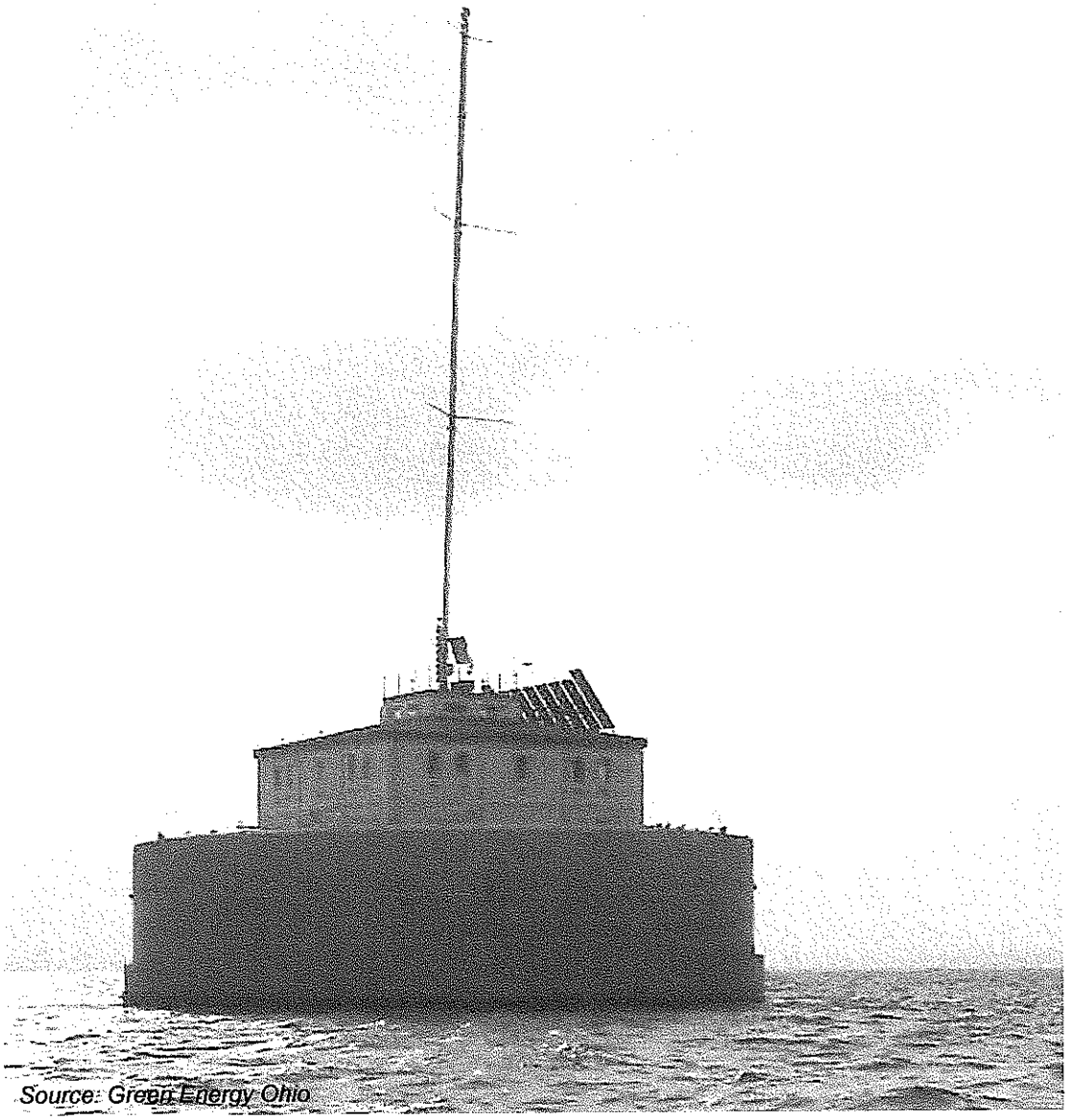
Notice:

This report contains findings from the first part of a two-part wind resource study. Part two will be complete in December 2008. ***The Wind Resource Assessment is just one of several studies within the Great Lakes Wind Energy Center Feasibility Study. Conclusions drawn from a single report are strictly preliminary.***

The Great Lakes Wind Energy Center Feasibility Study is being conducted by JW Great Lakes Wind LLC (JWGL), with its parent company juwi GmbH, on behalf of the Cuyahoga County Great Lakes Energy Development Task Force. Please direct questions regarding the Great Lakes Wind Energy Center Feasibility Study to Ryan Miday at p4rm1@cuyahogacounty.us or (216) 299-9326.

Disclaimer:

This report was prepared by JW Great Lakes Wind LLC and its parent company juwi GmbH. While procedures for assessing wind resource herein are consistent with industry best practices and standards, neither JW Great Lakes Wind LLC nor juwi GmbH makes any warranty of representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report. Neither JW Great Lakes Wind LLC nor juwi GmbH assumes any liability with respect to the use of, or damages resulting from the use of, any information disclosed in this report.



Source: Green Energy Ohio

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1 Executive Summary

A meteorological ("met") measuring tower was installed by Green Energy Ohio and other volunteers on the Cleveland Water Intake Crib in August 2005 to measure the available wind resource and offshore wind energy potential on Lake Erie. Built in 1904, the Crib is located approximately 3.5 miles northwest of downtown Cleveland and Cuyahoga County, Ohio. Data transmission began on September 20, 2005 and continues to date.

The Crib wind monitoring project is a result of City, County, and State level leadership and organizations interested in evaluating the potential of offshore wind energy on Lake Erie. In line with that interest, in January 2008 JW Great Lakes Wind, a wind energy development company and wholly-owned subsidiary of juwi GmbH, contracted with Cuyahoga County as Project Manager to conduct a feasibility study for a pilot offshore wind energy project. juwi-JWGL has over twelve years experience in planning, design, and installation of utility-scale wind projects, including wind resource assessment. This Wind Resource Assessment is provided to Cuyahoga County as part of the Great Lakes Wind Energy Center Feasibility Study.

This report provides a summary and analysis of two years of wind data collected at the Crib between October 1, 2005 and September 30, 2007. Instrumentation on the Crib tower includes six anemometers, six wind vanes, and two temperature sensors. Anemometers and wind vanes are placed on booms oriented south and northwest, and at 30 m, 40 m, and 50 m above lake level. Data from six anemometers and the three south-oriented wind vanes were provided to juwi-JWGL by Cuyahoga County for analysis. Summary meteorological parameters and discussion concerning wind speed, wind direction, wind shear, and Weibull factors are presented herein. Turbine electricity production estimates are not included as a final siting determination for the project has not been made. The final wind report for the GLWEC Feasibility Study will be issued in December 2008 and will include a detailed turbine availability assessment and production estimates. If available, juwi-JWGL will also incorporate additional months of Crib data into the final wind report.

Excluding the permanent failure of a 40 m anemometer after 10 months of operation in July 2006, overall data availability across all sensors is very high at approximately 97%. This compares well against industry standards and provides a robust dataset for analysis. A redundant anemometer provides backup data at 40 m.

The average wind speed at 50 m height across two years of Crib data is 7.35 m/s (16.4 mph). Wind speeds from the two year period are correlated with historical NCEP/NCAR data sources (30 years) and Burke Lakefront Airport (10 years) for a long term corrected average wind speed at 50 m of 7.24 m/s (16.19 mph). The Burke Lakefront ASOS weather station data show a very high correlation of $R^2 = 0.90$, and a correlation of $R^2 = 0.73$ with the NCEP/NCAR data is still considered good for the industry. Both data sources indicate that the two years of measurement at the Crib yield wind speeds slightly higher than historical averages. The NCEP/NCAR data are used to verify and apply a weighted average to the long term adjustment with Burke Lakefront. According to the National Renewable Energy Laboratory's wind power classification, the Crib ranks as a Class 4 site.

Measured wind shear factors, which describe the relative increase in wind speed with height above ground, are in the range of 0.04 – 0.067. Given these values, projected long term average wind speeds at 70 m and 80 m are approximately 7.34 - 7.41 m/s (~16.5 mph) and 7.37 – 7.47 m/s (16.6 mph), respectively. Shear factors in the range of 0.04 – 0.067, while plausible, are unexpectedly low even for offshore sites. For example, average shear factors at the FINO1 offshore test platform in the German North Sea—approximately 28 miles from the closest land—are 0.1 – 0.11. Possible influences on shear values include the Crib structure itself and the Cleveland cityscape. Uncertainties regarding wind shear calculations (and hence wind speeds at hub height) warrant further investigation. Possibilities include SODAR and LiDAR technology, and/or validation of Crib instrumentation following decommissioning or removal. juwi-JWGL will assist the County and Task Force in this process as part of its role in the GLWEC Feasibility Study.

Not surprisingly, prevailing wind direction at the Crib is from the southwest, consistent with other sites in Ohio. Over 45% of the time during the two year period wind is from the 120° sector between and including south and west. This is in part an explanation for relatively low wind speeds at the Crib compared to locations further east, west, or north. From the southwest, wind flows over land with higher roughness before meeting Lake Erie, having only a few miles over the lower roughness of the water before measurement at the Crib. The geography of the Cleveland "bay" creates an area of relatively lower wind speed compared to nearby areas of Lake Erie.

Table 1: Key results of two year Crib data summary

Met mast	Height	Data availability	Measured mean wind speed	Long term correlated mean wind speed
Cleveland Water Intake Crib	166 ft (50.6 m)	97%	7.35 m/s	7.24 m/s

In January 2008 Green Energy Ohio issued a report detailing the results of their assessment of the same two years of wind data as those included herein. The key results of the GEO report and those provided herein are very similar. A comparison of the major findings is shown in Table 2. The primary difference between the two reports stems from the number of data points included in the analysis. juwi-JWGL includes more data, which leads to slightly higher wind speed averages and shear values than those found in the GEO report. By weighting the Burke Lakefront data using NCEP/NCAR reanalysis data as an additional reference, the affect of Burke Lakefront data on long term adjustment is limited. The justification for weighting the Burke Lakefront data is based on juwi-JWGL's belief that the City of Cleveland is negatively influencing wind speed at the Crib—hence juwi-JWGL's estimated long term average wind speed is higher than GEO's estimate.

Table 2: Comparison of key results between juwi-JWGL and GEO reports

	juwi-JWGL, August 2008	Green Energy Ohio, January 2008
Data period	Oct. 05 – Sep. 07	Oct. 05 – Sep. 07
Data availability	97%	96%
Average wind speed at 50 m	7.35 m/s	7.34 m/s
Average wind speed at 40 m	7.27 m/s	7.25 m/s
Average wind speed at 30 m	7.22 m/s	7.14 m/s
Dominant wind direction	SW	SW
Shear factor	0.04 – 0.067	0.02 – 0.04
Correlation with Burke Lakefront data	$R^2 = 0.9$	$R^2 = 0.9$
50 m long term adjusted wind speed	7.24 m/s	7.21 m/s