

**Great Lakes Wind Energy Center
Final Feasibility Study**

QUESTIONS AND ANSWERS

May 1, 2009

Why does Cuyahoga County want to be the first to create a freshwater wind farm?

The County is committed to driving economic development in our region. With a long history of industrial manufacturing and dozens of companies already supplying components to the wind industry, our region is primed to become a leader in the offshore wind industry, and is dedicated to become active in this pursuit.

If Cuyahoga County wants to establish a hub for wind energy here in Cleveland, how many jobs will it bring to Northeast Ohio?

It is impossible to precisely quantify how many jobs will be created through an offshore wind industry. However, to illustrate the potential economic impact, the British Wind Energy Association retained Bain & Company in 2008 to conduct a study on this issue. The Bain study concluded that aggressive development of offshore wind energy markets in the U.K. by 2020 (34 GW) would generate about 57,000 jobs. Given the theoretical wind resource potential in the Great Lakes is well over 100 GW, it is not a stretch to say that tens of thousands of jobs could be possible in the coming decades to serve a Great Lakes offshore wind industry. We, in Northeast Ohio, can capture a disproportionate share of that opportunity, if we move promptly to maintain a leadership position.

What are the Task Force's next steps?

The Feasibility Study marks a key milestone in the ongoing activities to establish an offshore wind industry in Northeast Ohio. The Task Force will continue to engage key stakeholders, including state and local officials, and satisfy regulatory bodies through ongoing study and research. In addition, the Task Force is committed to exploring a variety of financing and policy options, and will pursue opportunities with interested turbine manufacturers and developers.

Who is going to pay for the Pilot Project? And how much will it cost?

The Task Force and its Project partners will continue to investigate funding sources for a potential Pilot Project. In the final report, a total of eight potential Pilot Project scenarios were evaluated, representing a range in capital investment of \$77.2 - \$92.7 million. While capital estimates can be made regarding a potential Pilot Project, other indeterminate factors, including Federal stimulus money, grant funding availability, policies to enhance the economic appeal of offshore wind, and other private and public investments could contribute to the overall amount required for financing.

Based on the capital investment cost estimates for a small offshore Pilot Project, can we assume that large, utility-scale Projects on Lake Erie will cost billions of dollars?

The capital costs associated with this Project are higher than comparable wind projects onshore, primarily due to costs associated with offshore installation and maintenance, and the small size of the Project. Designed to test and prove concepts, and promote technological and commercial development, a potential Pilot Project should not be expected to provide attractive economics as with a large-scale, commercial project. Therefore, the estimated economics of the Pilot Project should not be considered to reflect the future economics of subsequent offshore wind projects on Lake Erie.

How much does offshore wind energy cost, and how does it compare with other sources of energy?

We know offshore wind is currently more expensive than conventional sources of energy. For example, today it costs approximately 4-6 cents/kWh* to generate electricity from conventional sources (e.g. new coal) while wind turbines in good onshore locations in Ohio generate electricity for about 7-9 cents/kWh. In comparison, new nuclear and coal, especially with carbon capture and sequestration, plants will be significantly more expensive than currently operating plants.

Compared to *onshore* wind energy, *offshore* wind is also more expensive. However, as early as next year, conventional energy prices in Ohio are predicted to go up primarily due to the rising cost of fossil fuels. Building wind turbines and an Applied Research and Development Center on Lake Erie should ultimately drive down the cost of wind energy and position our region to be ahead of the curve in developing wind technology. We expect offshore wind energy to become more cost competitive over time, especially as the price of fuel continues to rise, good locations onshore are developed, and mechanisms for carbon regulation in the U.S. emerge.

**If this figure seems lower than the cost on your electricity bill, it is because it is based on the cost to generate the energy only, not including transmission and other costs also included in your bill.*

Will local manufacturing companies supply components and help build Pilot Project turbines?

Northeast Ohio is home to several manufacturing companies currently supplying turbine components to the wind industry. The Task Force and its Project partners are committed to leveraging the great resources available in our region as well as driving economic development and creating jobs.

What are other Great Lakes states doing in the field of offshore wind energy?

The Task Force believes that with the release of the final Feasibility Study, our Project is the most comprehensive, publicly available study for a freshwater wind energy Project in the Great Lakes. Other Great Lakes states working toward an offshore wind energy agenda include Michigan, which established the Great Lakes Wind Council in February 2009 to begin investigating the potential for wind energy development on the Great Lakes. In addition, the New York Power Authority announced on April 22, 2009 that it will begin the process of determining feasibility for large, utility-scale wind power on Lake Ontario and Lake Erie.

Who is going to buy the power generated by the turbines?

The Task Force is continuing to explore opportunities with Cleveland Public Power and Cleveland Electric Illuminating Company. The Task Force is pleased by the interest expressed by these two companies, and by their cooperation in completing the Feasibility Study.

Have you decided on a specific location for the wind turbines on Lake Erie?

No. While the focus for a potential Pilot Project is three to five miles offshore near downtown Cleveland, no specific location has been determined. Many factors influence placement, including geology, ecology, recreation, fishing, shipping, airport flight patterns, legal permitting factors and visual impact. The final Feasibility Study offers recommendations for proposed Project sites and includes the justification for those sites; however, no specific sites will be selected until further consultation with regulatory agencies and other stakeholders, especially the citizens of this region.

Will the wind turbines be visible from the shoreline?

Yes. However, the exact location of the turbines will depend on a variety of factors. If the Pilot Project moves forward, wind turbines may be built approximately three to five miles offshore. Preliminary renderings suggest that the visual impact would likely be very small. With many industrial landmarks in downtown Cleveland, we believe that offshore wind turbines may serve as a symbol to position Cleveland as a “green city on a blue lake” and enhance the overall image of our region.

Will you be able to go near the turbines?

Most likely. Many European offshore wind farms serve as tourist attractions, where visitors can travel right up to the structure. Additionally, the United States does not currently have any regulations restricting travel in and around offshore wind farms.

How would the Pilot Project wind turbines affect Lake Erie’s bird populations?

Based on the conclusions of the avian risk assessment for the proposed Project site, the findings do not indicate that habitat loss, barrier effect and collision mortality pose significant risk to the current avian populations inhabiting the Project site and its surrounding area. Except in winter, when waterbirds concentrate at warm-water outlets that remain ice-free, and in fall migration, when large numbers of common waterfowl and gulls stage on Lake Erie, waterbird diversity and abundance along the highly developed Cleveland lakefront is dominated by a few common species. Studies indicate that this diversity and abundance decrease with distance from the lakefront as water becomes deeper offshore. Few waterbirds are able to forage farther from the lakeshore. At the Project site, two to five miles offshore in water depths exceeding 33 feet (10 m), very few birds will be using these waters. In winter, the site will lack waterbirds; however, when the lake is ice-free, some species, mainly gulls, may forage or even attempt to perch on the turbines.

What would post-construction avian studies entail?

The Avian Risk Assessment recommends that post-construction study of avian interaction be done through an established Technical Advisory Committee (TAC), which would include members of USFWS, ODNR, Cuyahoga County Board of Commissioners, representatives from the wind development community, Great Lakes Energy Development Task Force and other relevant stakeholders. This approach to post-construction studies has been used at more than a dozen wind power projects across the country. Post-construction studies would include a carcass search, and may incorporate the use of drift nets as a means of finding and gathering carcasses of birds that have collided with the turbines. Other post-construction study efforts may include the use of remote methods, including but not limited to direct visual and radar observations from the Cleveland Crib, as well as boat and aerial surveys. In addition, any fatality study research should look comparatively at impacts from other types of power generation supplying electricity in Ohio.

How will the potential turbine locations affect recreational users of the Lake?

As the final Feasibility Study shows, all of the proposed turbine configurations are preliminary Pilot Project recommendations, not absolute locations. In addition, the proposed sites include considerations for sailboat race courses, the Audubon Ohio Important Bird Area, shipping lanes and other issues. While the sites are merely preliminary locations, the Task Force and its Project partners will consult commercial and recreational users of the lake before making any recommendations for moving forward with a Pilot Project.

How will ice on Lake Erie affect wind turbines?

Ice is not identified as a prohibiting factor for wind turbines in the proposed Project area. However, it is expected to be the principal design driver for the foundations of the turbine towers. The proposed site locations for the Pilot Project are considered more moderate areas of the Great Lakes, with respect to expected ice thickness. Because of ice conditions on Lake Erie, a cone-shaped ice deflector in the waterline should be considered to break up ice, reduce loading on the turbine structure and avoid or minimize ice-induced vibrations.

What is the wind resource for the Pilot Project/Project area?

Lake Erie possesses the best wind resource in Ohio. For a potential Pilot Project, the long-term annual average wind speed is estimated to be approximately 7.5 m/s at 80 m height.

If I live in a suburb of Cleveland, can I purchase the renewable energy from the turbines?

Depending on the final arrangement decided by the utility company purchasing the power generated by a Pilot Project, it is possible that a local utility could implement an optional renewable energy purchase program for those wishing to support and buy energy from the Pilot Project.

How will the public be engaged in the future development of this Project?

The Task Force is committed to engaging the public and all valued stakeholders in the future development of a Pilot Project. Our course of action will depend on a variety of factors, but we look forward to maintaining transparency in all efforts to share information with the public. Please visit <http://development.cuyahogacounty.us/en-US/energy-task-force.aspx> for a schedule of Great Lakes Energy Development Task Force meetings.

What is the risk of large vessels and ships colliding with offshore wind turbines?

Recommended Pilot Project locations account for established shipping lanes on Lake Erie. A minimum buffer of approximately 1,200 feet from the lane center is applied in the Feasibility Study. Through consultation with the Lake Carrier's Association, Port Authority, and other stakeholders, final turbine placement will account for appropriate collision risk management and mitigation.

What is the risk of small vessels, jet-skis, etc. colliding with offshore wind turbines?

As with other structures in the Lake, such as the Cleveland water intake crib, turbines on Lake Erie will be well marked and lit to help watercraft avoid collision.

Will a yacht or sailboat mast clear an offshore wind turbine rotor and blade, or is there risk of collision?

The Royal Yachting Club suggests a minimum clearance from the water to the lowest point the turbine blade reaches 22 meters (72 feet). Typical mast heights for sailboats on Lake Erie are approximately 60 feet. Sailboat mast heights will be a factor in determining the turbine size and tower height.

Who will service the turbines?

Trained wind turbine technicians will service offshore turbines. Because there is currently no market in the U.S. for these technicians, operations and maintenance cost estimates presented in the Feasibility Study represent research, equipment/technology development, and job growth opportunities.

How will the service technicians be trained?

Because freshwater wind farms do not exist anywhere in the world, there is great opportunity in the Great Lakes region, especially in Northeast Ohio, to begin developing new access techniques, research, and equipment in icing environments. The Task Force and its Project team are committed to partnering with educational institutions to determine how best to move forward in developing career courses at area institutions.