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INTRODUCTION

Citizens' Greener Evanston (CGE) first proposed that the City of Evanston explore the possibility of an offshore wind farm on Lake Michigan in November, 2007. CGE's Renewable Energy Taskforce has continued to develop the idea to the point that the City of Evanston recently sent out an RFI (Request For Information) for potential wind developers to review and comment on.

CGE strongly supports moving ahead with this project for several reasons. Wind farms are a growing source of clean energy generated in this country. With the chances of averting the worst consequences of global warming diminishing, it is imperative that alternatives to current energy sources responsible for much of our greenhouse gas emissions be fully explored. The City of Evanston, by pursuing this project, will be demonstrating that even a medium scaled city can take major steps to ensure that its homes and businesses have access to clean energy that will significantly reduce greenhouse gas emissions at the local level.

The Evanston Wind Farm project emerged from the concerns and research of citizen volunteers who have a considerable stake in the community. These concerned citizens have been out-front in making the City and its residents aware of the project and its implications. A September 2010 poll by Citizens Utility Board found that nearly 85% of the respondents were in favor of an offshore wind farm in Lake Michigan (see "*Has there been a Survey*" for additional information)

It is time to move ahead. As energy becomes more expensive, especially that which is produced by using fossil fuels and nuclear materials, a reliable source of clean energy near our boundaries will be a tremendous asset in building Evanston's viability as a sustainable community.





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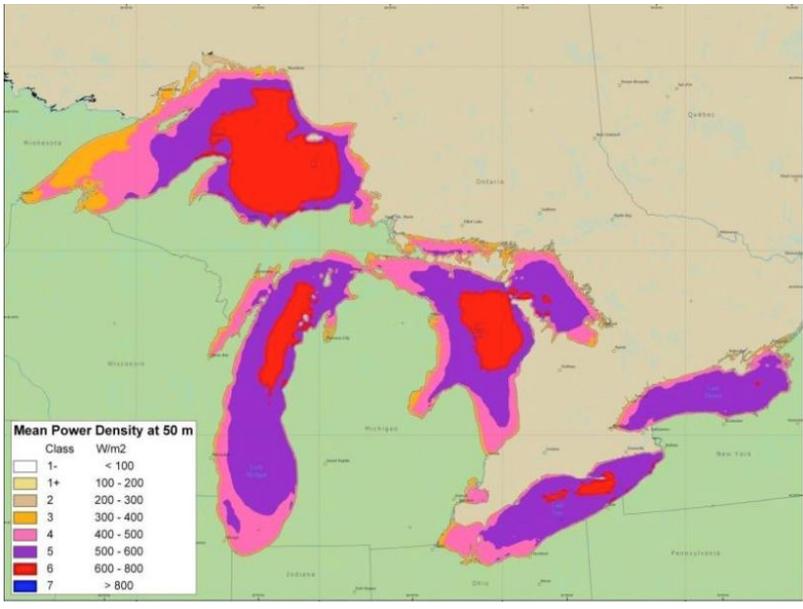
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1 Why is Evanston a good choice for an offshore wind farm?

We have good wind. It is estimated that the average annual winds are approximately 18 to 20 mph directly offshore. Offshore wind speeds tend to be higher and the wind is steadier. This means that turbines built further offshore will capture more wind energy. Because wind power goes up with the *cube* of wind speed (doubling the wind speed produces *eight* times the power!), locating a wind farm in the lake will most likely be the most productive location in all of Illinois.

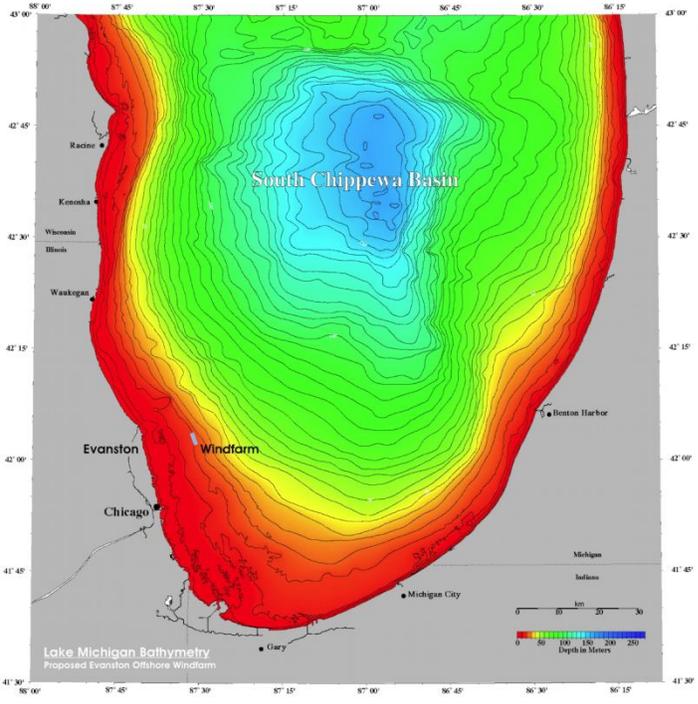


Offshore wind typically produces its maximum power in the middle of the day when the power is most needed and can therefore offset fossil fueled peak power plants (coal and natural gas) that produce the most CO2 emissions.

The lakebed in front of Evanston is relatively shallow (less than 100') for several miles from the waterline. Thus, construction costs will be cheaper than other deeper water sites. Erecting the turbines farther from the shore will improve their performance due to the sustained wind speeds farther from shore.

In addition to improving their performance, locating the turbines farther from shore will also mitigate the potential visual disruption.

The area offshore of Evanston has no significant water use conflicts. There are no islands, river mouths, reefs or other natural configurations that might be harmed.





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One of the major problems with many wind farm proposals is that they are too far from the consumers; however, that is not the case due to Evanston's proximity to the wind farm.

The vast majority of offshore sites being considered in the U.S. are working in close partnership with nationally renowned engineering schools. Having the wind farm located adjacent to Northwestern would seem to foster a natural partnership opportunity with the McCormick Engineering School.

2 Where exactly are the wind turbines to be located?

The exact location depends on the results of a feasibility study, which will take into account the contours of the lakebed, the wind profile, and other technical and aesthetic considerations.

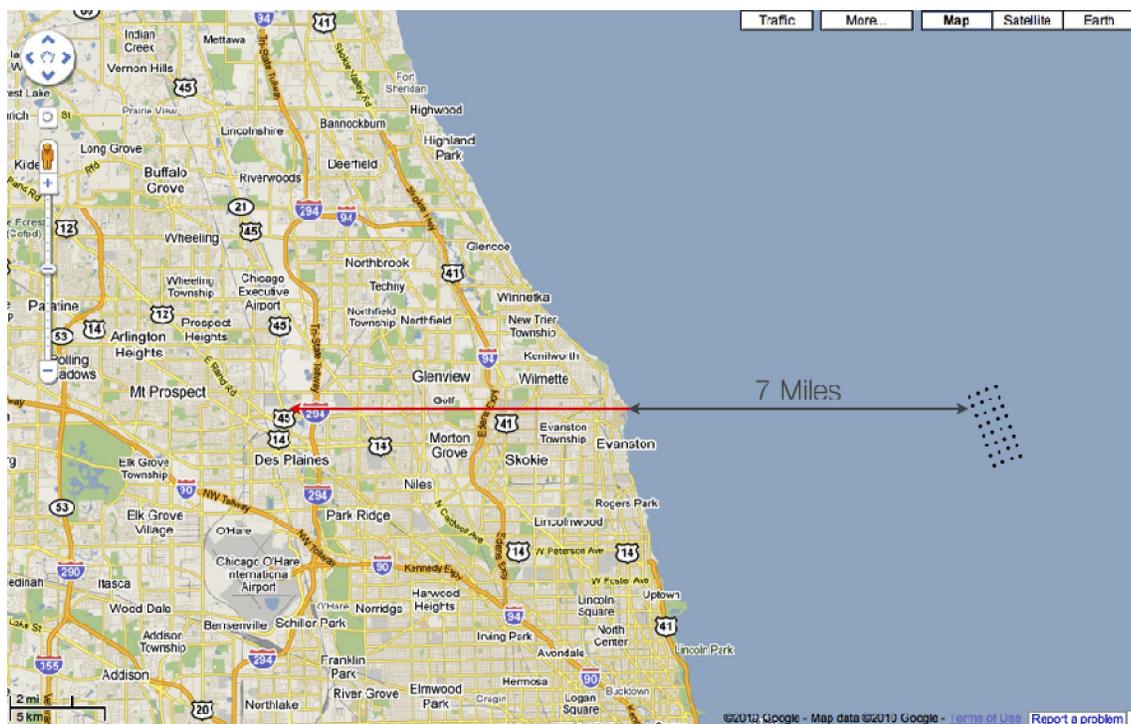


The working concept places the turbines approximately seven miles off the Evanston shore stretching between Northwestern's northern boundary to the southern edge of Dawes Park. The current notion for the layout of the wind farm is to have the turbines arrayed in rows slightly angled from the northwest to the southeast. This layout will limit the visual impact of the turbines both to the north and south of the site.



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For perspective on how to think about 'seven' miles the wind farm will be the equivalent distance from the lake shore as the lake shore is to Des Plaines, east of I294.



3 How much electricity will be produced

For reference, the proposed turbines would produce enough electricity to power between 59,000 and 82,000 homes. This would provide power for the equivalent of all of the residences of Evanston (there are approximately 30,000 homes in Evanston). Any extra capacity could be used for commercial and industrial needs or sold to neighboring towns, such as Skokie, Wilmette and Chicago.

4 How many jobs will come to Evanston?

Directly, probably not many, but indirect benefits are possible. Wind farms do not need a lot of manpower for ongoing maintenance. Since the wind farm is tentatively located 4 miles offshore, access by boat may come from the industrial harbor of Chicago or possibly Waukegan.

Northwestern has expressed interest in the wind farm via the related research that it could bring to the University.

There could be significant tourism dollars and related jobs created by the wind farm – see the tourism section below.

Since turbines of this size are difficult to transport long distances, the wind industry has brought many manufacturing jobs to the Midwest.



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5 How many wind turbines will there be?

The current proposal calls for the installation of 40 or more turbines, but this number is flexible and can change once a feasibility study is conducted. The goal is to produce more than 200MW of power.

6 Where will the power come onshore?

The most likely access point to the shoreline is at the water plant, at the north end of Northwestern's campus. There are other alternatives, but the water plant also has a robust connection to the electricity grid, making it an elegant choice. The cable will not affect water intake or water quality (see point immediately above). The cable will be underground as comes ashore.

7 What is a wind turbine and how does it work?

Wind turbines, like windmills, are mounted on towers to capture the most energy. At 100 feet (30 meters) or more above ground, they can take advantage of faster and less turbulent wind. Turbines catch the wind's energy with their propeller-like blades. Usually, two or three blades are mounted on a shaft to form a *rotor*.



A blade acts much like an airplane wing. When the wind blows, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade toward it, causing the rotor to turn. This is called *lift*. The force of the lift is actually much stronger than the wind's force against the front side of the blade, which is called *drag*. The combination of lift and drag causes the rotor to spin like a propeller, and the turning shaft spins a generator to make electricity.

Turbine subsystems include:

- A rotor, or blades, which convert the wind's energy into rotational shaft energy;
- A nacelle (enclosure) containing a drive train, usually including a gearbox and a generator;
- A tower, to support the rotor and drive train; and
- Electronic equipment such as controls, electrical cables, ground support equipment, and interconnection equipment.
- Other features on current turbines include monitoring systems, aviation markings on the blades, aviation lights, service personnel lift, smoke detectors, fire extinguishing system in nacelle, Low temperature operation, Ice detection system



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8 How big is a wind turbine?

Offshore turbine designs have very large rotors—at the moment, the largest is over 110 meter (360 foot) diameter and the hub (nacelle) sits 100 meters above the water line.

In terms of power generation, the largest offshore wind turbines are currently rated up to 6 megawatts.

9 How many homes can one megawatt of wind energy supply?

An average U.S. household uses about 10,655 kilowatt-hours (kWh) of electricity each year. A one megawatt wind turbine can generate from 2.4 to more than 3 million kWh annually, enough for 225 to 300 households. It is important to note that since the wind does not blow all of the time, it cannot be the only power source for that many households.

It is estimated that the proposed array of 40 turbines would be able to provide enough power annually for essentially all of Evanston's households plus potentially some portion of the power needed for commercial and industrial uses. For reference, Evanston has about 32,000 residences.

Depending on the actual wind found offshore, the wind farm would offset between 490,684 and 681,528 tons of CO₂, which is equal to 350% to 486% of the City of Evanston's goal for CO₂ abatement, as outlined in the Evanston Climate Action Plan.

10 What are the overall environmental benefits of wind power?

Wind energy system operations do not generate air or water emissions and do not produce hazardous waste. Nor do they deplete natural resources such as coal, oil, or gas, or cause environmental damage through resource extraction and transportation, or require significant amounts of water during operation. Wind's pollution-free electricity can help reduce the environmental damage caused by power generation in the U.S. and worldwide.

ENVIRONMENTAL ISSUES

11 What are the specific environmental benefits of wind power?

In 1997, U.S. power plants emitted 70% of the sulfur dioxide, 34% of carbon dioxide, 33% of nitrogen oxides, 28% of particulate matter and 23% of toxic heavy metals released into our nation's environment, mostly the air. These figures are currently increasing in spite of efforts to roll back air pollution through the federal Clean Air Act.

Sulfur dioxide and nitrogen oxides cause acid rain. Acid rain harms forests and the wildlife they support. Many lakes in the U.S. Northeast have become biologically dead because of this form of pollution. Acid rain also corrodes buildings and



economic infrastructure such as bridges. Nitrogen oxides (which are released by otherwise clean-burning natural gas) are also a primary component of smog.

Carbon dioxide (CO₂) is a global warming pollutant --its buildup in the atmosphere contributes to global warming by trapping the sun's rays on the earth as in a greenhouse. The U.S., with 5% of the world's population, emits 23% of the world's CO₂. The build-up of global warming pollution is not only causing a gradual rise in average temperatures, but also seems to be increasing fluctuations in weather patterns and causing more frequent and severe droughts and floods. The World Meteorological Organization (WMO) warned in July 2003, that extreme weather events appear to be increasing in number due to climate change.

Particulate matter is of growing concern because of its impacts on health. Its presence in the air along with other pollutants has contributed to make asthma one of the fastest growing childhood ailments in industrial and developing countries alike, and it has also recently been linked to lung cancer. Similarly, urban smog has been linked to low birth weight, premature births, stillbirths and infant deaths. In the United States, the research has documented ill effects on infants even in cities with modern pollution controls.

Toxic heavy metals accumulate in the environment and up the biological food chain. A number of states have banned or limited the eating of fish from fresh-water lakes because of concerns about mercury, a toxic heavy metal, accumulating in their tissue.

Development of just 10% of the wind potential in the 10 windiest U.S. states would provide more than enough energy to displace emissions from the nation's coal-fired power plants and eliminate the nation's major source of acid rain; reduce total U.S. emissions of CO₂ by almost a third; and help contain the spread of asthma and other respiratory diseases aggravated or caused by air pollution in this country.

If wind energy were to provide 20% of the nation's electricity -- a very realistic and achievable goal with the current technology -- it could displace more than a third of the emissions from coal-fired power plants.

12 Don't wind turbines kill birds?

Birds occasionally collide with turbines, as they do with any tall structure. A few older wind projects have raised concerns about bird impacts because they were built in areas with sensitive raptor populations. Careful siting and wildlife studies make it possible to avoid most wildlife problems.

Detailed studies and monitoring following construction of other wind farms indicate that this is a site-specific issue that will not be a problem at most potential wind sites. Also, wind's overall impact on birds is low compared with other human-related sources of avian mortality—no matter how extensively wind is developed in the future, bird deaths from wind energy are unlikely to ever reach as high as 1% of those from other human-related sources such as hunters, house cats, buildings, and autos. (House cats, for example, are believed to kill *1 billion* birds annually in the U.S. alone.) Wind is, quite literally, a drop in the bucket. Still, areas that are commonly used by threatened or endangered bird species should be regarded as



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unsuitable for wind development. Unfortunately, one of the oldest wind farms in the US, in Altamont Pass, California is badly situated and has killed birds, including endangered species. The wind industry is working with environmental groups, federal regulators, and other interested parties to develop methods of measuring and mitigating wind energy's effect on birds.

Onshore wind energy can also negatively impact birds and other wildlife by fragmenting habitat, both through installation and operation of wind turbines themselves and through the roads and power lines that may be needed. This has been raised as an issue in areas with unbroken stretches of prairie grasslands or of forests. More research is needed to better understand these impacts.

Offshore wind turbines may affect migratory birds. Citizens' Greener Evanston have already had a series of discussions concerning this issue with the local branch of the National Audubon Society.

13 ...or bats?

Bat deaths at wind plants generally tend to be low in number and to involve common species that are quite numerous. Human disturbance of hibernating bats in caves is a far greater threat to species of concern. Still, a surprisingly high number of bat kills at a new wind plant in West Virginia in the fall of 2003 has raised concerns. Research at the West Virginia plant, as well as another in Pennsylvania, documented in 2004, suggests that the problem may be a regional one. The wind industry has joined with the U.S. Fish and Wildlife Service, the U.S. Department of Energy's National Renewable Energy Laboratory, and Bat Conservation International to form the Bats and Wind Energy Cooperative (BWEC), which funded the 2004 research program and is continuing to explore ways to avoid or reduce bat kills. One simple yet effective method is to shut down the turbines for a short period of time when conditions for bat deaths exist. Since this occurs only briefly and in low wind situations, overall power output is not greatly affected. It is believed that bats generally are not out on the lake at the location of the proposed wind farm. As with the birds, bat studies will need to be done to determine what issues will have to be taken into account.

14 Will turbines affect marine life?

There are three significant stages of a wind farm from the point of view of marine life: construction, operation and decommissioning. Construction and decommissioning have the potential to generate the most amount of disturbance, and the wind industry, as well as several marine conservation groups, is currently investigating these impacts on marine life.

However, it is important that such impacts be considered in the context of other marine activities such as fishing, shipping, oil and gas extraction, etc. Also, it should be noted that the duration of the construction and decommissioning would be about 6 months. For the 20-year operational period there are no known impacts on marine life.

It has been suggested that the noise from wind turbines will travel underwater and could disturb sea life. However, studies carried out on the impact of noise from



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existing offshore turbines note that the noise is very low frequency, and many species are unable to hear it.

As with any other local impact issues, these concerns will be addressed while a wind farm project is going through the permitting process.

15 Will construction affect the lakebed?

Any proposed wind farm will involve a full investigation of wave and coastal processes prior to construction. However, the turbine structures and distance offshore are such that it is very unlikely they would significantly affect the lakebed, wave patterns or water quality. There is no evidence from the European experience with offshore wind farms of any detrimental effects on coastal processes. The installation of the foundation for the each wind turbine would be similar to how a bridge support is installed, which is not an uncommon element in the waters in the area.

METEOROLOGICAL ISSUES

16 What if there's a storm in the Lake?

As with onshore turbines, offshore turbines are warranted and tested to withstand extreme wind conditions. In the event of severe weather, the blades turn out of the wind and will slow down for safety reasons when wind speeds reach 50 miles per hour and above. Offshore wind turbines in the North Sea withstand gales and storms similar or worse to what turbines in Lake Michigan will experience.

17 How will winter ice affect the wind farm?

Ice in all its forms represents an unknown engineering challenge for any Great Lakes wind farm. While there are no wind farms operating in areas of icing such as the Great Lakes, there are structures in the lakes, such as the water intake cribs, that have survived for many, many years. Thus, while it is a challenge, there has been no record that CGE can find describing this as a reason to not pursue the feasibility of the wind farm project.

Similarly, maintenance during the winter will present a challenge; however, there are excellent examples from Europe for maintenance protocols in rough and winter seas and likely those will form the foundation of the procedures for the Great Lakes.



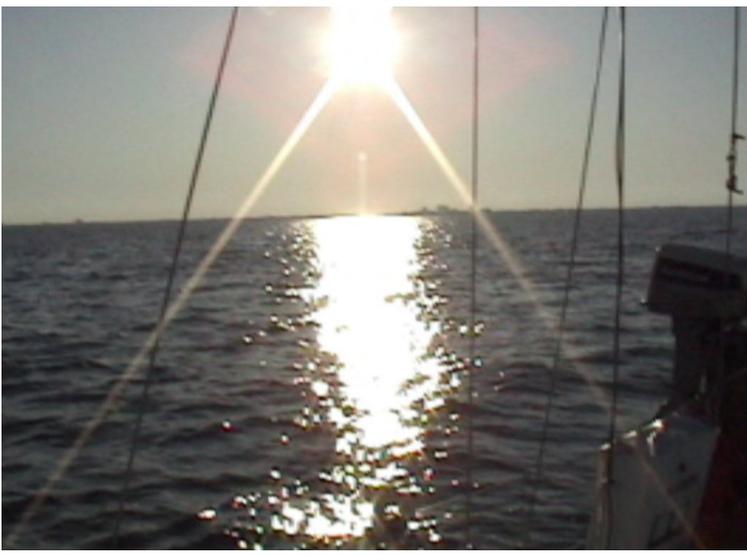


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RECREATIONAL/AESTHETIC CONCERNS

18 What will I see from the beach in Evanston?

Obviously, this depends on the size of the turbines, exactly how close they are to the shore and weather conditions. The short answer is that turbines seven miles offshore will be barely visible. Here is a picture taken from four miles offshore (remember the turbines will be seven miles offshore) looking back at the Evanston skyline. The visual impact is very small.



Visual impacts can be minimized through careful design of a wind farm. Given the uniform size and array of the turbines, the visual impact will be significantly mitigated. Computer simulation is helpful in evaluating visual impacts before construction begins. Public opinion polls show that the vast majority of people favor wind energy, and support for wind plants often increases once they are installed and operational.

19 Aren't wind turbines noisy?

On a windy day, the sound of the turbine is drowned out by the wind even just a short distance from the turbine. Aerodynamic noise has been reduced by changing the thickness of the blades' trailing edges and by making machines "upwind" rather than "downwind" so that the wind hits the rotor blades first, then the tower (on downwind designs where the wind hits the tower first, its "shadow" can cause a thumping noise each time a blade passes behind the tower). A small amount of noise is generated by the mechanical components of the turbine. To put this into perspective, a wind turbine 300 meters away is no noisier than the reading room of a library.

Remember, the Evanston offshore wind farm will be at least seven miles away. For comparison, that is equal to the distance from the lakefront to west of US 294 in Des Plaines. It is unlikely to ever cause disruption by noise.



20 Will I be able to boat/sail near the turbines?

There will be boundaries for boaters to observe for safety. The U.S. Coast Guard authorizes wind turbine locations for navigational concerns and determines the markings, lights,



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and fog signals needed. Should a ship inadvertently go off course, its radar will readily detect the wind turbines, which are excellent radar reflectors. Wind turbines are also equipped with warning devices to alert ships in foul weather.

21 Will turbines interfere with fishing?

There is no evidence to suggest that total fish catch will decline as a result of wind farm developments due to the small amount of lakebed required. In fact, many environmental groups believe that wind farms will provide welcome sanctuary for fish spawning.

The wind industry is working actively with the fishing industry to ensure that the fishing industry is not disadvantaged by the growth of offshore wind farms.





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PROCESS

22 Who is Citizens' Greener Evanston and where do they get their funding?

Citizens' Greener Evanston is a group of community members working together with the City of Evanston to help reduce its greenhouse gas (GHG) emissions and overall carbon footprint. CGE receives no funding from outside sources, nor is it aligned with any other organization.

23 What is Evanston's role in the creation and operation of the wind farm?

Evanston has three major roles:

1. Ensure the process is open and transparent from beginning to end.
2. Push the various regulatory agencies, especially the State of Illinois to act promptly and efficiently throughout the permitting process.
3. Provide guidance to the project to ensure that the wind farm meets the City's objectives.

24 Who will do the feasibility study?

A wind developer will lead the study. Based upon the RFI responses (see separate question on RFI), a buoy or meteorological tower will be placed at the site and gather exact wind data. Specific wind testing can be done with methods such as wind anemometers and LIDAR, a type of radar to track wind speeds.

The developer may join with Northwestern and other research groups for assistance. The developer will also likely work with the City of Chicago to obtain the detailed meteorological data from Chicago's water intake cribs.

Having the water intake cribs in Chicago is a tremendous advantage that other sites in the Great Lakes typically do not have. One thought is to locate an additional wind speed test tower on the Wilson Avenue water intake crib. Because of the crib, expensive structures to support temporary data gathering equipment would not be necessary.

25 Who will do the construction?

The wind developer will contract a specialist in offshore construction. The construction work requires very specialized crane ships and other support vessels that are located in the Great Lakes.





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Because other cities such as Toronto and Cleveland (and others) are already moving forward with their plans for offshore wind farms in the Great Lakes, this equipment will already be in place.

Construction requires special equipment

- On Shore interconnect most likely would occur at the Evanston Water Plant at the northern edge of the project

1. Monopile Foundation	4. Interarray cables
2. Turbine Blade	5. Offshore substation platform
3. Nacelle	6. Onshore substation

Construction



26 Who will maintain and operate the wind farm?

The wind developer may continue as the operator, or they may sell the wind farm to an operator. The developer may also subcontract the operational work.

Operation and maintenance includes regular inspection, replacement of wear items, periodic adjustments, etc. Wind turbines require relatively little maintenance and the operating staff will likely be quite small.

27 Who will own the wind farm?

The wind developer may be the owner, or after construction, they may sell or lease the farm.

It is possible the wind farm can be a public utility, owned at least in part by the City of Evanston. However, public ownership also presents other obligations, including financial, and represent another level of consideration. ***The current concept as foreseen by CGE is for the City of Evanston to have very little if any financial involvement in the wind farm.***



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28 What are the steps needed to have an operating wind farm?

The first step is to judge the interest from developers to build the wind farm. The City of Evanston solicited a Request for Information in April 2010 and responses were received in early July. The responses and actions are noted in a separate question in this document.

Generally, the next step would be a wind feasibility study. This study would include a thorough economic analysis, geotechnical analysis of the proposed site, wind studies, etc.

After determining that the project is feasible, the developer will begin the process to secure approvals from the various agencies in the city, county, state and federal governments. During the approval cycle detailed environmental studies will be undertaken and financing will be arranged.

Community outreach will need to be an ongoing event to keep the local stakeholders informed on key decisions. Contract discussions with the power purchasers will begin. Once all the parties involved approve the contracts, the construction phase begins (see below for more details). Upon completing construction, the wind turbines will be operational for the next 20 years. The time from the start of the project until the wind farm becomes operational is approximately seven years.

29 What happens during the feasibility study?

The most important factor to consider in the construction of a wind energy facility is the site's wind resource. A site must have a minimum annual average wind speed in the neighborhood of 11-13 mph to even be considered (initial research suggests Evanston's wind is comfortably above the minimum, 17-21 mph). To study the wind, a temporary tower may be set up on site to gather wind data at various altitudes over the course of many months or even years.

Further, the fact that a site is windy does not mean it is suitable for wind power development. A developer needs to consider many factors in a project. Is there any migratory bird activity in the area that the wind farm might interfere with? Are there endangered or protected species that could be jeopardized by the presence of the facility? Is the site's geology suitable and appropriate for industrial development? Will noise and aesthetics be issues for the local community? Will the turbines obstruct the flight path of local air traffic? These are some of the environmental and social issues that will need to be addressed in the siting of a wind power facility.

30 What permits are required to build a wind farm?

This list is not exhaustive. For the Feasibility Study approvals are likely needed from:

- City of Evanston (and preferably from Northwestern University)
- Cook County
- Illinois EPA
- Federal Aviation Administration
- US Coast Guard



For construction and operation of the wind farm:

- State of IL: Submerged land lease
- US Army Corps of Engineers Construction approval
- US Fish and Wildlife
- Department of Defense
- City of Evanston
- Cook County
- Illinois EPA
- Federal Aviation Administration: Air hazard navigation
- US Coast Guard:

The precedent for the permitting sequence for offshore wind turbines in the Great Lakes has not yet been established. The US Army Corp of Engineers has indicated they would like to be the lead agency, however the States in the Great Lakes are also indicating they will be the lead. The states of Michigan and Ohio have proposed frameworks for permitting and Illinois could follow these two states patterns.



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ECONOMIC/FINANCIAL CONCERNS

31 Preliminary Cost/Benefits

The Evanston Climate Action Plan's Renewable Energy Task Force developed the following preliminary estimated numbers. All of these numbers need to be verified, but have served as the initial starting point for cost estimating, power production and carbon offsets.



32 Evanston and the Kyoto Protocol

In October 2006, the Evanston City Council voted unanimously to sign the U.S. Mayors Climate Protection Agreement, an initiative launched in 2005 that invites cities to 'meet or beat' the targets of the 2005 Kyoto Protocol. The goal: to reduce greenhouse gas (GHG) emissions to 7% below 1990 levels by 2012. The City then conducted a community-wide inventory of its GHG emissions and found that, in order to meet this goal, Evanston must reduce its emissions by 13%, or 140,104 metric tons of carbon dioxide equivalent (MTCO₂E).



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33 Wind Energy Production and Carbon Offset Scenarios

At 15 mph (known wind speed at Oak Street water intake crib at 24M height)

1 turbine one hour	1000 kWh (per the provided power curve)
1 turbine one day	1000 kWh x 24 = 24,000 kWh (24 MWh)
One turbine per year	24 MWh x 365 = 8760 MWh (8.8 GWh)
40 turbine array	8.8 GWh x 40 = 350.4 GWh
CO2 abatement lbs./yr.	350,400,000 kWh x 1.556 lbs CO2e/kwh = 545,222,400 lbs CO2e
CO2 abatement tons/yr.	545,222,400 lbs CO2e /2000 lbs per ton = 272,611 tons
Number of homes offset	350.4 GWh/yr. /10,655 kwh per typical single home/yr. = 32,886 homes.
% of target CO2 emissions reduction	195%

At 18 mph (per current wind charts at 90M height above waterline)

1 turbine one hour	1800 kWh (per the provided power curve)
1 turbine one day	1800 kWh x 24 = 43,200 kWh (43.2 MWh)
One turbine per year	43.2 MWh x 365 = 15,768 MWh (15.8 GWh)
40 turbine array	15.8 GWh x 40 = 630.7 GWh
CO2 abatement lbs./yr.	630,700,000 kWh x 1.556 lbs CO2e/kwh = 981,369,200 lbs CO2e
CO2 abatement tons/yr.	981,369,200 lbs CO2e /2000 lbs per ton = 490,684 tons
Number of homes offset	630.7 GWh/yr. /10,655 kwh per typical single home/yr. = 59,192 homes.
% of target CO2 emissions reduction	350%

At 20 mph

1 turbine one hour	2500 kWh (per the provided power curve)
1 turbine one day	2500 kWh x 24 = 60,000 kWh (60.0 MWh)
One turbine per year	60.0 MWh x 365 = 21,900 MWh (21.9 GWh)
40 turbine array	21.9 GWh x 40 = 876 GWh
CO2 abatement lbs./yr.	876,000,000 kWh x 1.556 lbs CO2e/kwh = 1,363,056,000 lbs CO2e
CO2 abatement tons/yr.	1,363,056,000 lbs CO2e /2000 lbs per ton = 681,528 tons
Number of homes offset	876 GWh/yr. /10,655 kwh per typical single home/yr. = 82,215 homes.
% of target CO2 emissions reduction	486%

34 Wind Farm Cost

The National Renewal Energy Laboratory estimated the average capital investment of \$4,250 per kW for an offshore wind project in 2010. The wind turbine itself contributes 44% of this total

A good estimate at this point is about \$400M for the entire system. A brief discussion with a large wind farm consultant agreed that the number was in the right area and suggested that the cost at this early point be estimated at \$340M to \$400M.



The annual maintenance costs are currently not known but are estimated to be approximately 2% (about \$8M annually).

35 Power Costs

The power produced by the wind farm would be enough to offset between 59,000 to 82,000 households. For this analysis, assume it would power the equivalent of 70,000 homes.

A very simple analysis of the cost of power would be as follows. \$400M cost plus \$8M for annual O&M for twenty years (additional \$160M) divided by 70,000 homes spread out over 20 years at 12 months/year = \$33.33 per month. Multiplying that at three times for interest and profit still has the cost around \$100 per month for power per household. This seems to be in the correct range to make sense for both end users and for a developer.

36 Tourism Benefit

Tourism may potentially increase because we have a wind farm. People visiting Evanston could take tour boats out to the wind farm and there could possibly be an observation deck on one of the towers. The views out from approximately 200' above the water and at that distance in the Lake would be amazing. It is likely that one could see all the way around the southern end of Lake Michigan, plus the view of Chicago itself would be worth the trip.

37 Where will the financing come from?

This is a highly capital intensive project and financing will likely be complex and involve many parties. There are no plans at this time for financing to come from the City of Evanston.

After the developer determines how much wind is available and has a reasonable draft of the design of the wind farm, he will estimate the power that the farm will generate and how much he can get for the power. Using this revenue projection and the costs he will calculate for the construction and operations, the developer will arrange financing. All the assumptions are the financing would be private, that is the loans held by banks. The City of Evanston would have no role in securing financing or holding the debt.

The City and perhaps Northwestern, can assist the developer in obtaining financing by helping the developer secure a long term Power Purchase Agreement(PPA). Other cities, such as Skokie, Wilmette, Chicago, etc may also buy power generated by the wind farm and their commitments will also help the developer obtain financing.

PPAs are also subject to regulatory oversight, ensuring citizens the right to comment and question where and what they will pay for their power.



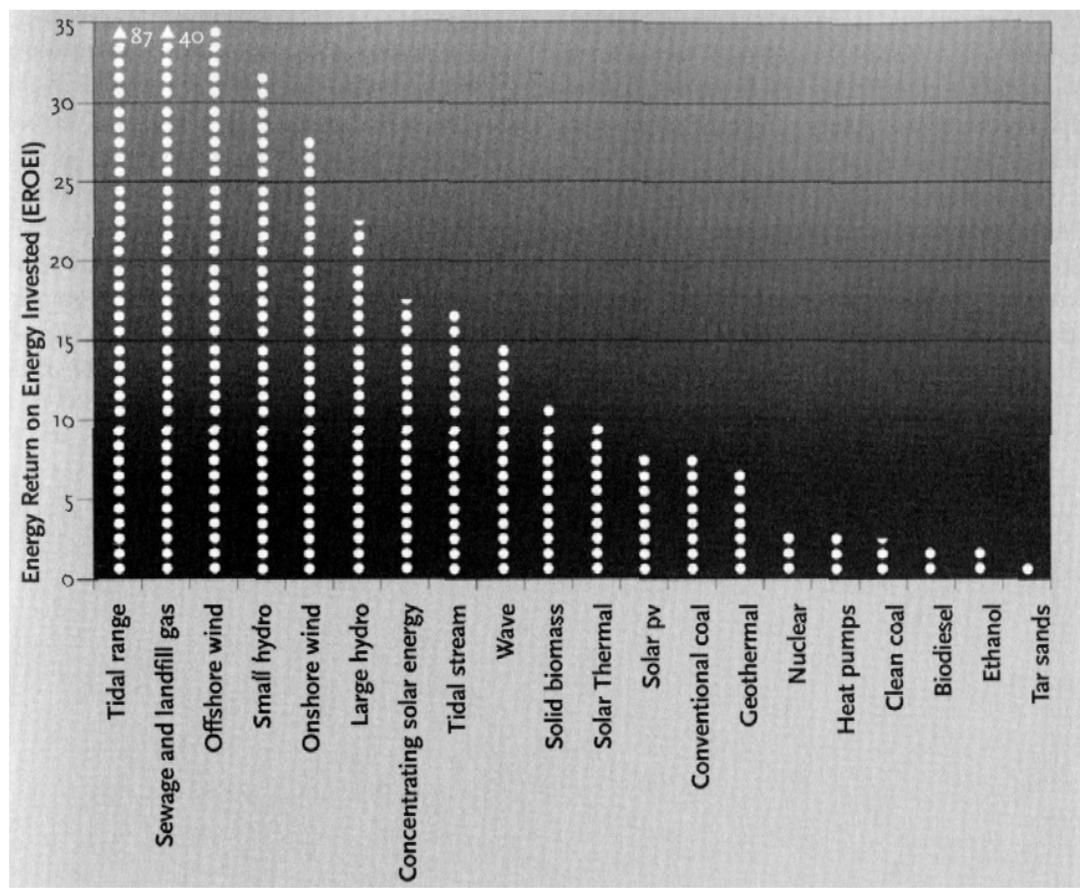
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38 Is wind energy expensive?

Wind energy is the cheapest form of new electricity generation available today. Wind power is more expensive than power from old, established power plants (in particular cheap dirty coal plants), but is cost competitive with any new power plant.

New power comparisons are key. We will need new power generation facilities to replace aging coal and nuclear plants in the coming years. The two cheapest choices for new power are wind and natural gas.

Here is a graph comparing the various types of energy production



Credit: The Ecologist magazine

39 How much of the project will be eligible to receive tax breaks, subsidies or other benefits from the government?

It is impossible to say how much benefit the wind farm will receive from either the state or government. The programs are constantly changing and funding shifts each year. It is likely the project will be eligible for some tax benefit, but the exact amount and situation is undeterminable at this time. Also, most energy production, coal, oil, ethanol, wind, solar, biomass, etc receives tax credits and benefits of some sort – Evanston’s wind farm would be no different than any other energy producer.

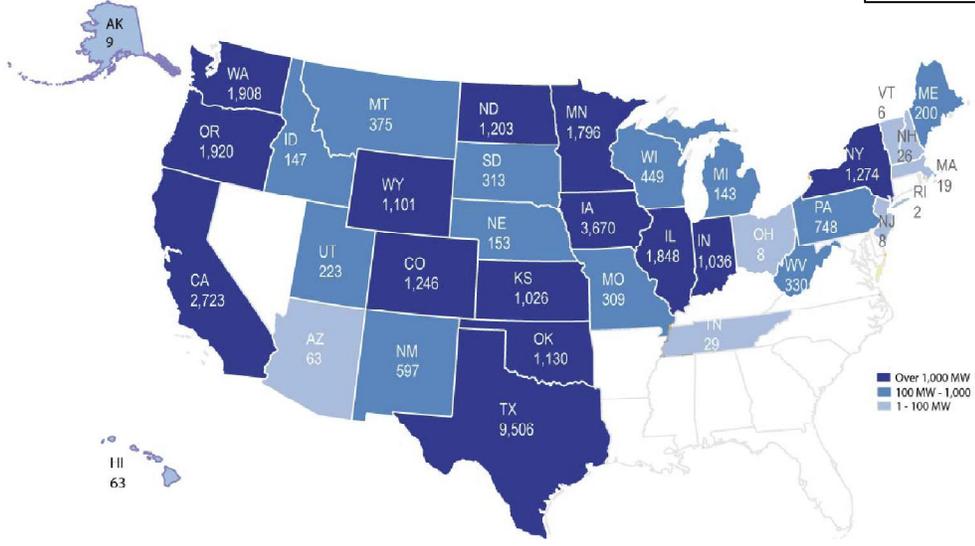
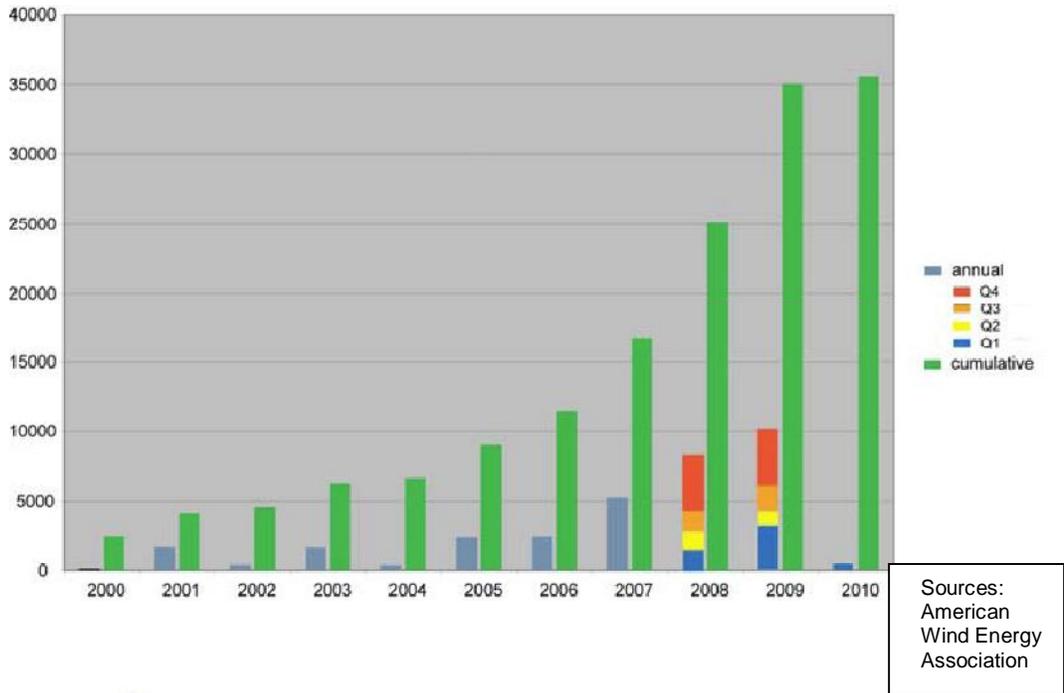


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40 What is the status of the wind energy market in the United States?

The U.S. wind industry broke all previous records by installing nearly 10,000 megawatts (MW) of new generating capacity in 2009 (enough to serve over 2.4 million homes). These new projects place wind power neck and neck with natural gas as the leading source of new electricity generation for the country. Together, the two sources account for about 80% of the new capacity added in the year.

The total wind power capacity now operating in the U.S. is over 35,600 MW, generating enough to power the equivalent of 9.7 million homes. America's wind power fleet will avoid an estimated 62 million tons of carbon dioxide annually, equivalent to taking 10.5 million cars off the road, and will conserve approximately 20 billion gallons of water annually, which would otherwise be consumed for steam or cooling in conventional power plants





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COMMUNITY CONCERNS/FACT VS. FICTION

41 Will wind energy hurt tourism?

We think it will help tourism in Evanston. An offshore wind farm will bring publicity to our community and enhance Evanston's image. There is no evidence that wind farms reduce tourism, and considerable evidence to the contrary. For example, in late 2002, a survey of 300 tourists in the Argyll region of Scotland, noted for its scenic beauty, found that 91% said the presence of new wind farms "would make no difference in whether they would return." Similar surveys of tourists in Vermont and Australia have produced similar results. Many rural areas in the U.S. have noted increases in tourism after wind farms have been installed, as have scenic areas in Denmark, the world's leader in percentage of national electricity supplied by wind. Other telling indicators: local governments frequently decide to install information stands and signs near wind farms for tourists; wind farms are regularly featured on post cards, magazine covers, and web pages.

42 Will wind energy negatively impact my real estate values?

A recently completed study by the Lawrence Berkeley National Laboratory titled "The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis" concludes that neither the view of the wind facilities nor the distance of homes to those facilities was found to have any consistent, measurable, and significant effect on the selling prices of those homes.

43 Why can there be opposition to wind energy projects?

First, Citizens' Greener Evanston specifically wants the process of creating a wind farm to be 100% transparent and open. There are many opinions surrounding an offshore wind farm as well as others who do not necessarily oppose a wind farm but are concerned that a public transparent process will be followed. All opinions are important and need to be heard publicly and by the public.

Local opposition to proposed wind farms usually arises because some people perceive that the development will spoil the view that they are used to. It is true that a large wind farm can be a significant change, but while some people express concern about the effect wind turbines have on the beauty of our landscape, others see them as elegant and beautiful, or symbols of a better, less polluted future.

The visual effect of wind farms is a subjective issue, but most of the other criticisms made about wind energy today are exaggerated or untrue, and simply reflect attempts by particular groups to discredit the technology, worry local communities, and turn them against proposed projects. In the electronic age, myths and misinformation about wind power spread at lightning speed.

The location of the proposed wind farm has been selected to minimize visual impacts. At its closest, the wind farm would be at least seven miles from shore. That location would be in-line with Northwestern University's shore. Other locations to the north or south of this point would be further away.



44 Who may be opposed to the wind farm?

Opposition may come from individuals and/or organized groups. In no particular order they are: negative impact on the view, opposition to using the lake for commercial use or more development, environmental effects, those with accident and disaster scenario concerns, groups that want to promote other technologies, and people worried about the cost of energy. This list is illustrative and not intended cover all possible actors.

45 What concerns about land based wind does not apply to off shore wind?

Many of the discussions about land-based wind do not apply to offshore wind farms. A few examples:

- Noise: wind turbines are relatively quiet; it is hard to imagine that one would be able to hear them on the shore.
- Flicker: There are complaints of 'flicker' – the moving shadow from the rotors causing health issues. Notwithstanding the further study recommended for this ailment, an offshore wind farm seven miles away from shore will not cause the 'flicker' complaint as the shadows will not project that far.

46 I've heard that wind energy doesn't really reduce pollution, because other, fossil-fired generating units have to be kept running on a standby basis in case the wind dies down. Is this true?

No. It is true that other generating plants have to be available to the power system's operator to supply electricity when the wind is not blowing. However, the wind does not just start and stop. Typically, wind speeds increase gradually and taper off gradually, and the system operator has time to move other plants on and off line as needed. The fluctuations in wind plant output change more slowly than do the changes in customer demand that a utility must adjust to throughout the day. Studies indicate that for a 100-megawatt wind plant, only about 2 megawatts of conventional capacity are needed to compensate for changes in wind plant output.

By combining a diverse group of both land based and offshore wind farms, power managers will utilize weather forecasting to predict daily regional energy production from the combined wind farms. This will enable the power managers to adjust peak power plant production according to the fluctuating demands throughout the day.

Also, and potentially most importantly, whenever the wind is blowing it displaces the most expensive conventional power plant that is generating. Typically, this tends to be the oldest and dirtiest gas plants on a utility system. Offshore wind turbines produce their peak power in the middle of the day when peak power demand is at its highest and therefore offshore wind farms reduce the need for these dirtier forms of energy production. Wind energy has the potential to make coal an obsolete form of energy.

47 Is wind energy dangerous to the public?

It has been estimated by a number of reliable sources that 50,000 Americans a year die from air pollution, of which about one-third is produced by power plants. By contrast, in 20 years of operation, the wind industry (which emits no pollutants) has recorded only one death of a member of the public--a German skydiver who parachuted off-course into an operating wind plant. Blade failures were more common in the industry's early years, but are very rare today because of better turbine design and engineering. Ice drops can occur but are of little danger because setbacks are sufficient to protect against danger to the public, and because ice buildup slows a turbine's rotation and will be sensed by a turbine's control system, causing the turbine to shut down. Given that the wind farm is no closer than seven miles to shore, this is not an issue to be concerned about.

48 Will a wind project interfere with electromagnetic transmissions such as radio, television, or cell-phone signals?

Large wind turbines can interfere with radio or TV signals if a turbine is in the "line of sight" between a receiver and the signal source, but this problem is unlikely to arise from an offshore wind farm.

49 Will a wind project interfere with radar?

Yes. Radar is basically designed to filter out stationary objects and display moving ones, and moving wind turbine blades create radar echoes. It is possible to modify a radar installation to eliminate this problem, according to a consulting firm that has studied it for the British government--see http://www.bwea.com/aviation/ams_report.html. According to the study: "This study concludes that radars can be modified to ensure that air safety is maintained in the presence of wind turbine farms. Individual circumstances will dictate the degree and cost of modification required, some installations may require no change at all whilst others may require significant modification."

The interference is generally limited to objects (airplanes) that are physically shadowed by the turbines (that is, very low-flying aircraft). The Federal Aviation Authority has approval on this subject and radar disruption (or lack of it) will be carefully studied before construction authorization is given.

50 What happens when the wind farm reaches its end of life? How will it be decommissioned?

Wind turbines last approximately 20 years or more. While the blades and mechanical components may need to be replaced, the tower and foundations should have a much longer if not indefinite lifespan. New turbines could be mounted on the existing towers and foundations and the wind farm would then continue operation for many more years.

At the end of the useful life either at 20 years or further into the future, a study must be undertaken to judge if re-constructing the wind farm would be less beneficial to the surrounding environment than leaving it in place. There will also likely be regulations about decommissioning wind farms by the time Evanston faces this



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issue. The thought at this point is that the wind farm developer would be required to fund an escrow account to levels sufficient to take care of any decommissioning costs.

51 Are there any offshore wind farms that have similar characteristics to Evanston's proposal?

Yes. The Swedes have erected a wind farm in Lake Vanern. Lake Vanern has only about 32% of the water that is in Lake Erie, but like the Great Lakes, Lake Vanern freezes in the winter, and it is one of the few places in the southern part of Sweden that is not covered with trees and buildings, or other obstacles against wind flow. The wind farm commenced commercial operations in May of 2010. The turbines are located in about 10 meters of water, on average 7 kilometers from shore.

Also, the UK's Thanet wind farm, opened in September 2010, has its nearest turbines positioned 7.4 miles from shore – similar to Evanston's 7 mile target. Note the Thanet wind farm is much, much bigger than Evanston's. We use this example because of the similar proximity to shore provides an illustration of how the view may be affected.

52 Are there any other offshore wind farms in the Great Lakes?

Not yet, but there are several proposals to construct wind farms in the Great Lakes. A feasibility study has been completed for a proposed wind farm in Lake Erie near Cleveland. Additional projects are being considered in Lake Ontario near Toronto and one on the New York side of the lake as well. Two other projects in Lake Michigan located near Muskegon and Ludington.

Here is a list of offshore wind projects (not a complete list) in North America:

CANADA (Ontario)

- Ontario is leading offshore wind development due to their feed in tariff
- Offshore wind guaranteed CDN 0.19/kWh (currently USD 0.18) for 20 yr PPA
- Streamlined approvals process administered by Ontario Power Authority
- Trillium Power Wind Corp. has several projects in development
- Trillium Power Wind I, 710 MW E. end of Lake Ontario near US border, construction to begin 2011
- 1600 MW Great Lakes Array (location not announced)
- 650 MW Superior Array (location not announced)
- 740 MW Trillium Power II, location not announced)
- Toronto Hydro is also active with 100 MW project near Toronto
- Southpoint Wind working on 30MW project in Lake Erie near Leamington

OHIO

- Cuyahoga County (Cleveland), 20 MW by 20112

OCEANIC PROJECTS

- New Jersey: leases have been granted for four 350 MW projects, strong support of the governor. Construction to begin 2011.
- Delaware: lease awarded for 450 MW project. Online 2014.

- Rhode Island: 424 MW project in development.
- Massachusetts: Cape Wind 468 MW permitted, construction to begin 2011.
- New York: preliminary studies underway for 350 to 700 MW project
- Maryland: looking for developers
- Texas: construction on 150 MW project to begin 2010, leases issued for two other 750 projects

Europe has held the lead in offshore wind, having installed more than 830 turbines with grid connections to nine European countries. Almost all of the 2,300 megawatts (MW) of installed capacity has been built in shallow waters (less than 30 meters deep). The market is continuing to expand, with Europe planning to add another 1,000 MW in 2010. An additional 50,000 MW is being planned or is under development for 2011 and beyond. (source NREL)

53 Did you know the wind farm has already won an award?

The wind farm won a 2010 Design Evanston Award in the category of Planning/Urban Design. Design Evanston awards honor the best of projects that enhance the quality of Evanston's built environment.

54 Have there been any polls to judge the public's reaction to the wind farm?

Yes, although the survey was unscientific.

A survey conducted in September 2010 by the Citizens Utility Board of Illinois, determined that 69.9% of residents responded in favor to the idea of a wind farm off the Lake Michigan shoreline. CUB says more than 2,000 people responded to the survey. The shore off Evanston is the only site in Illinois currently being promoted as a possible wind farm site in the lake.

CUB's Question:

Do you support the general idea of building a wind farm on Lake Michigan?

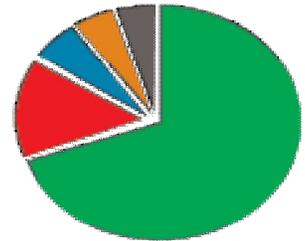
■ 69.9% Yes, offshore wind power is a clean, renewable energy source.

■ 14.7% Yes, but only if the wind turbines aren't visible from the shore.

■ 5.7% Not sure.

■ 5.1% No, building a wind farm in Lake Michigan would cost too much.

■ 4.5% No, wind turbines in Lake Michigan would be an eyesore



55 What was the result of the City's Request for Information (RFI)?

The City of Evanston issued the RFI on May 1, 2010 and responses were due on June 30th, 2010. The purpose of the RFI was to gather preliminary information on the feasibility of offshore wind power generation off Evanston's Lake Michigan border including; whether the wind is suitable, what this type of project would cost and how it would be financed, the size of such a facility and the amount of power it would



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generate, how the power would be sold, what, if any, the impacts would be on Lake Michigan wildlife and habitat, recreation, commercial and navigation activities. In addition, the intention of RFI was to identify potential partners, determine the City's role and gain a comprehensive understanding of the steps required for the development of a renewable energy facility off Evanston's Lake Michigan shore.

It is important to understand that the RFI is not a Request for Proposal (RFP). If the process continues, an RFP would be issued. *The respondents to the RFI are not intended to be the only groups being considered for the project.* It is intended that the RFP would have a qualifying stage (a Request for Qualifications (RFQ)) to determine suitable developers prior to issuing the RFP.

The City received three RFI submittals before the June 30, 2010 deadline. Two of these submittals were from developers and the third was from a consulting company offering assistance with the project. Since the primary objective of the RFI was to identify interested developers, the consulting firm response was not recommended to be pursued. The two companies that submitted information, Off Grid Technologies, Inc. (OGT) and Mercury Wind Energy (MWe) gave presentations to City Council on October 11, 2010.

The City is in the process of forming an adhoc committee (membership is being determined by the Rules Committee) to analyze the responses and provide the City with recommended next steps.



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RESOURCES/REFERENCES

56 Wind Resources Link

National Renewable Energy Laboratory: *Wind Resource Atlas of the United States*

<http://rredc.nrel.gov/wind/pubs/atlas>

Illinois Wind Energy Association American Wind Energy Association

<http://www.windforillinois.com/> <http://www.awea.org>

US Army Corp of Engineers

http://www.usace.army.mil/CECW/Pages/reg_permit.aspx

City of Evanston – see City Council notes, RFI responses

<http://www.cityofevanston.org/>

The Michigan Great Lakes Wind Council final report can be found at

www.michiganglowcouncil.org/.

The proposed Michigan offshore wind bill can be found at

www.legislature.mi.gov/documents/2009-2010/billintroduced/House/htm/2010-HIB-6564.htm.