Herkimer High School

2010 New York State Virtual Wind Farm Contest School Submissions

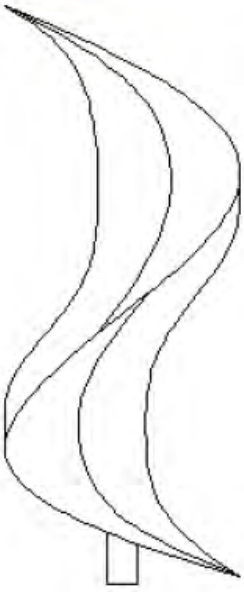
Wind Power

Wind power is one of the most significant sources of renewable alternative energy.

There are several benefits of using wind power. Not only is wind power the least expensive form of producing electricity, but the best thing about it is that it's free and will always be available, unlike nonrenewable resources such as coal. Wind power is a clean source of energy since it produces no carbon dioxide emissions, or other pollutants. According to people living near wind farms, sometimes the wind turbines can create an interesting landscape. This is also a good source of electrical energy for remote areas. where they are not connected to any electrical power grids. The turbines can be quite tall, but they actually do not take up large plots of lands; agriculture can still continue. Wind turbines are becoming more complex, making them more energy efficient.

Although there are plenty of advantages of wind power, there are also some disadvantages. The strength of the wind is not always constant, which means that the amount of electricity produced will vary. Some people think that the wind turbines disrupt the natural scenery and that they are loud. When the wind turbines are manufactured, a small percentage of pollution is produced.

Today, windmills are becoming a new part of our lives. This alternative source of energy will be able to save you money, reduce our need for foreign oil, which in turn will reduce green house gasses and the affects of global warming.



Blade designs are under constant review and study. The attached design is an exciting new concept that may be able to catch more wind in less area. It is expected to reduce the area needed for this wind farm.

The general location of our wind farm in Oswego, NY.

This portion of our project was designed to become a camera ready document. That could be used as an advertisement in a local newspaper, penny-saver publication or school newsletter. The publication includes global warming possible pros and cons of the farm and the location that was selected.

This document intent would be to publish before or after public hearings on the issue. It could also be a flyer to be handed out at a town meeting. To date it has not been published.

The virtual wind farm contest was a portion of a much larger project. The project included; blade design and testing. Beyond the blade design, the project included a report on the history of wind power and related research into the pros and cons of wind farms. The report also included the blade calculations for their designs and a full scale version of their design.

Along with the wind portion of the project, the students are also studying the temperature and conditions of the school building and the power that this structure is using. They are comparing their data to other districts through out the state that have a photovoltaic system on their campus.

Our group designed a wind farm that could produce a significant amount of wind power for a relatively small cost. Many factors influenced our design, including the environment, the population of the particular area around the wind farm, the cost to power and maintain the turbines, the power capacity, and even the wind farm's location. With these things in mind, we made our design to be energy efficient.

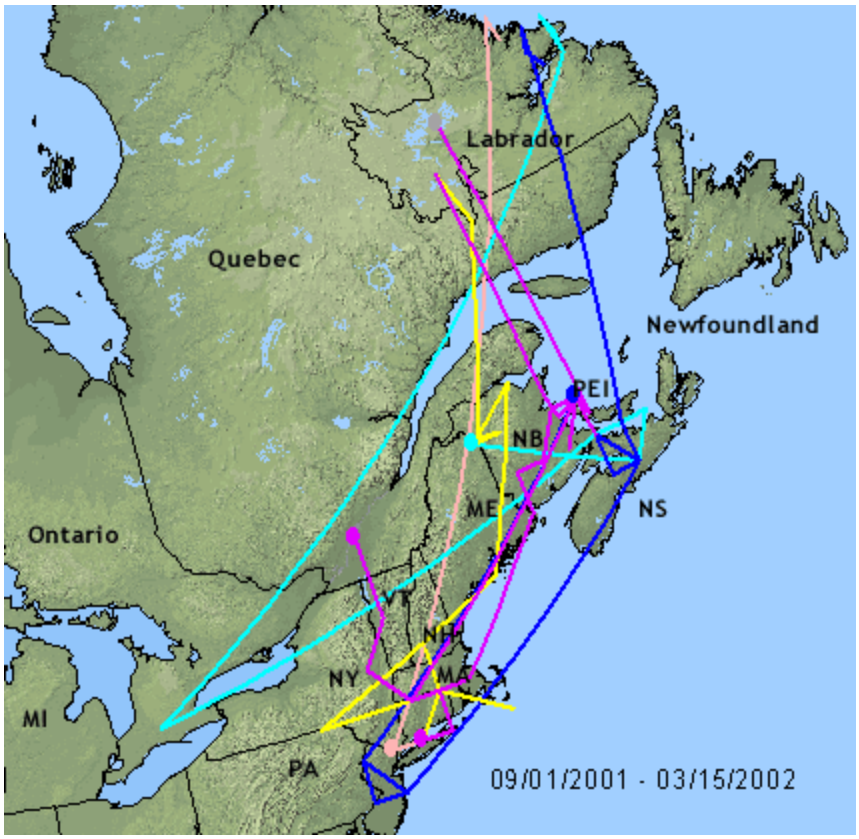
The location of the wind farm played a big role in developing its design. Our wind farm is located generally on the western part of Oswego County. Out of ten wind turbines, five of them are positioned on the coast of Lake Ontario, while the other five are located a little more inland. The total wind farm area is approximately 1.81 squared kilometers. One of the turbines was placed northwest of the Nine Mile Point Nuclear Station. That may become a problem for the nuclear power plant, as many people would loose their jobs at the station, but on the other hand, not only is wind energy more resourceful and efficient, people would gain jobs from the introduction of a wind farm. The area that we chose did not seem to be a highly populated and residential area, since there were not many buildings and housing complexes there. However, it was a pretty commercial area, mostly because of the nuclear power plant currently stationed there. We chose this location because it's near Lake Ontario and there will be greater wind velocity from the water. It will generate more wind and more speed for the voltage.

We also took into consideration the natural environment around the wind farm, such as the migration paths of the Canadian geese, which would greatly affect the proposed position of the wind farm. According to the Eastern Canada Migration Map, the Canadian geese follow a migration path about thirty miles north of our wind farm.

We suppose that the geese will not interfere with the wind power produced by the turbines, as well as there should be hardly any deaths of the geese or other birds associated with the wind turbines. The wind turbines should not disturb any of the natural environments around the wind farm. It will also not affect the population because the turbines are not near any populated areas, so there will be no noise problems and it will add scenery to the coast.

Our wind farm consists of ten wind turbines, of which the majority of them are quite similar. Nine of the wind turbines have a rotor diameter of ninety-six meters, and a tower height of one hundred meters; these turbines' type is "Clipper 2.5MV." Only one of the turbines is a "GE 1.5MV." It has a rotor diameter of eighty-two and a half meters, and a tower height of eighty meters. A factor that led us to select these particular turbine types, tower heights, and rotor diameters was whether it was energy efficient. Evidently, the smaller amount of towers, greater tower heights, and lower rotor diameters made it possible to produce more energy in a certainly lower cost. The "cost to energy ratio" of our wind farm is 0.52 $/kWh. Not only is our wind farm capable of efficiently produce power, this particular wind farm's power capacity is exactly twenty-four. Our wind farm design would be more efficient than other options for several notable reasons. The "cost to energy ratio" is considerably low; the turbines are not placed in residential areas, which may bother the people; the area of the wind farm is quite small, along with the fact that it will not purposely interfere with the environment in Oswego County.

Eastern Canada Migration Map



Oswego, NY


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Image © 2010 New York GIS
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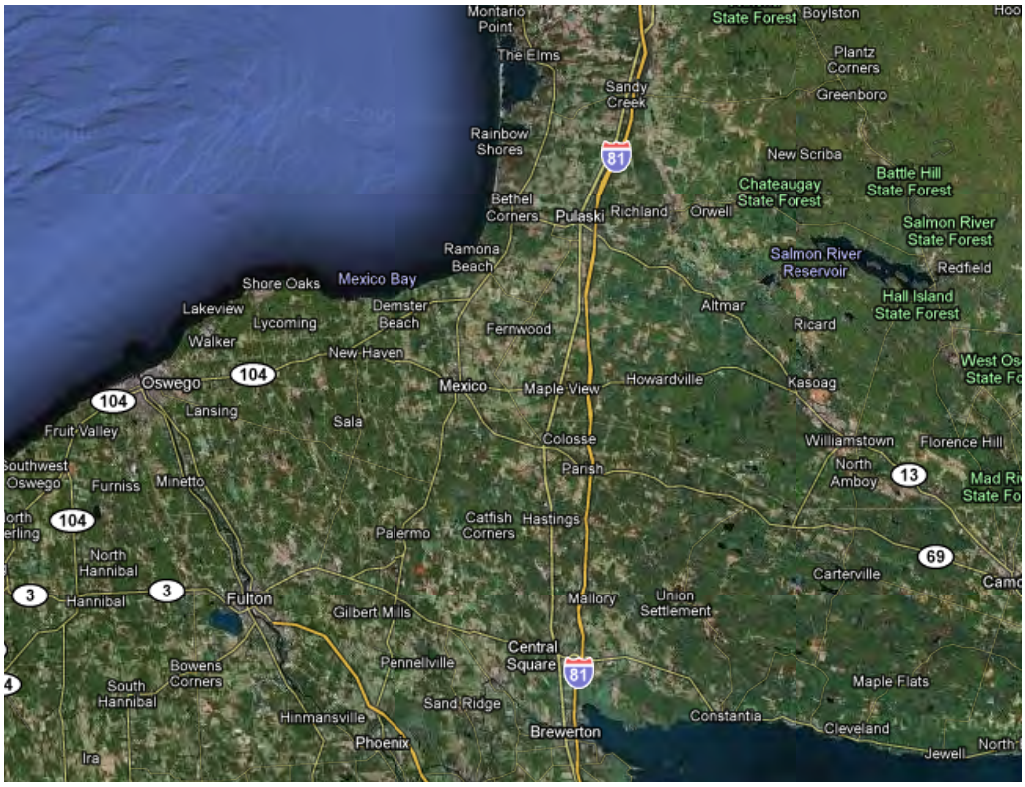
Google
Imagery Date: Mar 31, 2006
43°30'41.88" N
76°25'08.10" W
elev 277 ft
Eye alt 11192 ft

SchoolPower ...Naturally



Welcome Herk12

Wind Farm Energy Summary

Number of Turbines	10
Wind Farm Area (km2)	1.81
Power Capacity (MWh)	24.00
Energy Output Yearly (kWh/yr)	73,005,852

Wind Farm Emision Offsets

Sulfur Dioxide	
Kilograms per Year	61,792
Nitrogen Dioxide	
Kilograms per Year	30,239
Carbon Dioxide	
Kilograms per Year	26,655,451
Equivalent number of Cars Removed	4,846
Equivalent number of Trees Planted	4,520,401

Wind Farm Cost Summary

Turbines & Towers	$32,138,500
Installation	$3,720,000
Transmission Lines	$2,151,452
Service Roads	$220,075
Total	$38,230,027
Cost To Energy Ratio ($/kWh)	0.52