

USX Wind Resource Study

**Located at
87th St. and Lake Shore Dr.
Chicago, IL**

April 20, 2004

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Section I – Executive Summary

The city of Chicago's Department of Environment commissioned a one-year wind study from the Illinois Institute of Technology to determine the potential for wind energy generation along the southwestern shore of Lake Michigan. The project was initiated to collect general Chicagoland wind data as well as investigate how much wind energy would be available for small wind turbines. The data was collected with a 10 meter NRG-NOW anemometer system and then processed using industry standards for wind energy assessment studies.

The annual average wind speed was found to be 5.17m/s with an average wind power density of 177W/m². These parameters categorize the area as a Class 3 wind site. Class 3 areas are, in general, considered suitable for wind energy applications. The prevalent wind direction for the area was west and southwest, but the northeast direction (lakeside) was shown to be significant in terms of wind energy content.

Since there is also interest in sitting utility-scale wind turbines, the collected data was used to estimate the wind speed at 50m. A correlation/prediction method along with Midway airport weather data was used to determine the wind speed of a "typical" year, and then the data was extrapolated to a 50m height. The wind speed at 50m was predicted to be 6.34m/s with a power density of 280W/m². This is considered high Class 2 category, which is marginal for utility-scale turbines. The uncertainty associated with the extrapolation method is high and should not be considered a definitive representation.

It is recommended to further study the wind resources in the area by erecting a 50m anemometer tower. Data could then be collected for utility-scale wind turbine hub heights. Also, a wind turbine performance analysis should be carried out with the 10m data to estimate the energy production potential for a large wind turbine and the corresponding economic analysis.

Section II – Motivation

The City of Chicago has dedicated itself to being a leader in the advent of green energy. In the "2001 Energy Plan" from the City of Chicago Department of Environment, Chicago plans to purchase 20% of its electricity needs from renewable energy sources within five years. This will require the development of clean energy sources that are not currently available in the city. Since wind energy is quickly becoming the most economically renewable option in the field, a sizeable amount of this 20% can possibly come from wind power. Wind turbines offer an ability to create a substantial amount of electricity at a competitive price.

As the following section will show, the wind maps for Illinois show that there are some areas with high enough wind speeds to warrant investigating wind energy development in Chicago. However, these maps do not provide enough information to determine the wind resource characteristics at specific sites. In order to obtain a better idea of wind power in Chicago, weather towers must be erected and wind energy studies must be carried out. By collecting wind data from several locations in Chicago, the feasibility of erecting wind turbines can be assessed, as well as determining the optimal locations for these turbines. Additionally, making the data available on the IIT website [1], will hopefully generate interest in other sectors to develop wind power in the city.