A Guide to Residential Wind Power

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**Abstract**

Our project goal is to develop a set of guidelines that a consumer can use to become better informed about wind power and help determine whether or not investing in residential wind power is a good decision. Acceptability is determined by several factors, including: average wind speed in the area, the size and openness of the residential lot, any zoning laws or tax incentives in the area, the cost of electricity, the cost of installing a turbine, and the amount of time required to repay the investment. Specific examples of how the guidelines would be used to analyze different scenarios are included.

**Steps to determining if residential wind power is right for you**

1. **Look up the average wind speed for your area.** This information can be found on the wind speed map (left). It is recommended that your area has an average wind speed of 8 mph or better. The greater the wind speed, the more power the turbine will produce. In general, the most efficient areas of the United States for wind power are the Midwest and the Northeast.

2. **Check for any zoning laws and regulations in your area.** This information is cataloged on the site dsireusa.org. The site lists all state regulations that have an effect on the installation of wind turbines.

3. **Check for any financial incentives in your area.** This information is also cataloged on the site dsireusa.org. The site lists all federal and state tax credits, rebates, and financial incentives. These will reduce the initial investment of buying a turbine, and possibly decrease any amount the homeowner would have to pay.

4. **Look at the compiled list of wind turbines.** Choosing a particular turbine is the biggest step in the process. The reason for this decision can be one of many. Turbines that produce more energy are more expensive, and tend to be physically larger. The decision of which turbine to pick is based mostly on the specific needs and situation of each consumer. Take into account the price, size, and energy production of the turbines, and your particular need and desires about the turbine can narrow down your choices. Information about the best turbines can be seen on the chart.

5. **Calculate the total cost of the turbine or turbines you have narrowed your choices down to.** There are several factors that go into the total cost. Some of the smaller turbines can be installed manually, but many turbines require professional installation. If the turbine is grid connected, there is an extra cost to connect the turbine to the grid. If the turbine is battery charging, you need to purchase a battery and an inverter. Estimated costs are provided for installation, grid connection, batteries, and inverters.

6. **If you have chosen a grid connected turbine, determine if your local utility supports net metering.** Net metering is when the utility purchases any excess energy your turbine produces. This information can be found at www.dsireusa.org.

7. **Determine the payback period of the total investment of your turbine.** This can be found by looking up the monthly output of the turbine you selected, multiplying it by the amount you pay the utility per kilowatt hour, and multiplying this number by 12. This will tell you how much your turbine will save you per year, on average. Dividing the total cost of your turbine and all additional costs and any rebates you receive, by the amount you save per year. This will tell you how many years after installation your turbine will cover its own cost.

8. **After taking all of the factors into account, cost, amount of space, and payback period, you have enough information to make an educated decision on whether or not investing in wind power is right for you.**

**Wind Turbine Comparisons**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price of Turbine</th>
<th>Battery:</th>
<th>Cost/ Average Savings</th>
<th>Payback Period</th>
<th>Total Cost/ Average Savings</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Breeze</td>
<td>$5,144-$5,049</td>
<td>Concorde X-keeper Pro/ 1430T</td>
<td>$275</td>
<td>32.3 – 38.2 years</td>
<td>$800.00 – $1,200.00</td>
<td><a href="mailto:morggone@wpi.edu">morggone@wpi.edu</a></td>
</tr>
<tr>
<td>Whisper 100</td>
<td>$2,352.95</td>
<td>Sun X-Tender PVX-1080T</td>
<td>$275</td>
<td>32.3 – 38.2 years</td>
<td>$800.00 – $1,200.00</td>
<td><a href="mailto:spanagel@wpi.edu">spanagel@wpi.edu</a></td>
</tr>
<tr>
<td>Whisper 200</td>
<td>$5,011.52</td>
<td>Outback FX2524T</td>
<td>$275</td>
<td>32.3 – 38.2 years</td>
<td>$800.00 – $1,200.00</td>
<td><a href="mailto:spanagel@wpi.edu">spanagel@wpi.edu</a></td>
</tr>
<tr>
<td>Skystream 3.7</td>
<td>$4,395-$4,899</td>
<td>Procell 2100 US2</td>
<td>$275</td>
<td>32.3 – 38.2 years</td>
<td>$800.00 – $1,200.00</td>
<td><a href="mailto:spanagel@wpi.edu">spanagel@wpi.edu</a></td>
</tr>
<tr>
<td>Whisper 500</td>
<td>$8,200-$8,517.67</td>
<td>Outback FX2524T</td>
<td>$275</td>
<td>32.3 – 38.2 years</td>
<td>$800.00 – $1,200.00</td>
<td><a href="mailto:spanagel@wpi.edu">spanagel@wpi.edu</a></td>
</tr>
</tbody>
</table>

**Sample Case Study:**

**Binghamton, New York**

This case involves an average homeowner of the rural town in New York called Binghamton. The homeowner is looking for something to offset their electricity bill, especially during the colder months. There is not much room for a huge tower, but there are plenty of options for a smaller scale wind system that can certainly lower the cost.

**Step 1**

- **Average Wind Speed:** 10.5 mph (4.7 m/s)  
  - Average wind speed can be found using the map that we have provided, or go online and look at more detailed view of cities themselves. They have data from wind stations in many towns and they update it everyday.

**Step 2**

- **Net Metering allowed**  
  - Net Metering is the process of selling back the unused energy that builds up during times of low usage to a local utility.

**Step 3**

- **Tax Exemptions:**
  - Small systems (less than 25 kW): $2,000/kW up to $20,000 per project site

**Step 4**

- **The Air Breeze was chosen as a suitable turbine for a few reasons.** Due to the location of the home, the Air Breeze was not a feasible idea. What we were looking for was a small turbine that would produce enough energy to offset the smaller area of the grid, and possibly decrease the cost of electricity, the cost of installing a turbine, and the amount of time required to repay the investment.

**Step 5**

- **Choosing a particular turbine is the biggest step in the process.** The reason for this decision can be one of many. Turbines that produce more energy are more expensive, and tend to be physically larger. The decision of which turbine to pick is based mostly on the specific needs and situation of each consumer. Take into account the price, size, and energy production of the turbines, and your particular need and desires about the turbine can narrow down your choices. Information about the best turbines can be found on the chart.

**Step 6**

- **If you have chosen a grid connected turbine, determine if your local utility supports net metering.** Net metering is when the utility purchases any excess energy your turbine produces. This information can be found at www.dsireusa.org.

**Step 7**

- **How many years after installation your turbine will cover its own cost.**
  - Division the total cost of your turbine and all additional costs and any rebates you receive, by the amount you save per year. This will tell you how many years after installation your turbine will cover its own cost.

**Step 8**

- **After taking all of the factors into account, cost, amount of space, and payback period, you have enough information to make an educated decision on whether or not investing in wind power is right for you.**

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