Missouri Department of Natural Resources

Small Wind Energy Systems

Division of Energy fact sheet 06/2012

The case for customer-owned small wind turbines

Driven by concerns about the cost of energy, the nation's dependence on fossil fuels, the health impacts posed by emission of air pollutants and a greater awareness of the need to maintain healthy ecosystems, many Missourians want to know how to reduce their reliance on traditional energy sources. With the adoption of state standards for the interconnection of small renewable energy systems to the electrical distribution system that were in effect in 2008, technical feasibility of on-site generation of electricity is becoming more generally accepted.

News accounts of customer-owned on-site generation systems are often accompanied with information about the reduction in utility costs that are expected to follow. Commonly, the news stories do not point out that the cost-effectiveness of these systems varies substantially across the nation. Too often, stories about renewable energy fail to include information that will help local readers and viewers determine if the costs paid to buy and install wind power systems and the energy savings of the individual in the story are applicable to Missouri.

Unfortunately, financial feasibility is far from consistent. Key variables affecting financial feasibility include a) the cost you pay for electricity from your utility; b) the strength of the renewable energy resource (wind or sun); and c) the availability of financial incentives to help defray the cost of renewable energy equipment.

Economics of small wind systems in Missouri

Most retail electric prices in Missouri have historically been below the national average[1], and currently, no state financial incentives exist for residential small wind energy systems in Missouri. Consequently, in Missouri it is difficult to buy and install a wind energy system at your home, farm or business that will "pay back" its cost (recover the investment cost through utility bill reductions during the life of the system).

In most of the United States where utility power is available, the following three conditions usually apply for small wind energy systems to be economically attractive:

1. The site has very good wind resources (average annual wind speeds over 12 mph) at hub height, typically 80 to 120 feet above ground level.
2. Retail cost of electricity per kilowatt hour is above the national average
3. A substantial portion of the initial cost is eligible for financial incentives such as rebates and grants.

[1] The U.S Department of Energy's Energy Information Administration reports that in April 2012 the national average cost per kilowatt hour for residential customers was 11.65 cents for 2012 to date. EIA reports that the average retail price for Missouri residential customers was 9.07 cents, for the same time period. From April 2012 EIA report available online at: www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html

As not all of these conditions are found in Missouri, use of small-scale wind turbines to generate electricity at homes, businesses or farms is often economically marginal, even on the most promising sites. In general, electricity from small (10kw or less) wind systems has a higher cost per kilowatt hour than utility-provided power for nearly all Missourians.

Economics of small wind vs. wind farms

Utility scale wind energy systems (large wind farms) offer greater potential for economic viability than customer-scale systems. Typical tower (hub) height for today's large utility-scale wind turbines of 750 KW (kilowatt) to 2 MW (megawatt) rated capacity is 80 meters (262 feet). A typical height for small customer-scale turbines of up to 50 KW rated capacity is 30 meters, which is consistent with on-farm or residential use.

With more powerful wind-energy patterns found several hundred feet from the ground, it is often cost-effective to place large wind turbines on towers several times taller than those used for customer-scale wind turbines. In addition, there is an economy of scale associated with the installation of a cluster of large machines ("wind farm") that is not applicable to customer-scale developments. Another important difference is that the financial incentives available to utility-scale wind development are not available for wind systems that generate power for use on-site.

Internet resources related to Small Wind Energy Systems:

- Interstate Renewable Energy Council's Small Wind Energy Web page
  www.irecusa.org/index.php?id=40
- Renew Wisconsin's, Small Wind Toolbox
  www.renewwisconsin.org/wind/windtoolbox.html
- American Wind Energy Association's Small Wind Web page
  www.awea.org/smallwind/
- Missouri Anemometer Loan Project Initial Results
  www.dnr.mo.gov/energy/renewables/wind-alp.htm
- Map of average annual wind speeds in Missouri, at 100 feet (30 meters) above ground level
  http://dnr.mo.gov/energy/renewables/wind-energy.htm
- Incentives available for renewable energy, grouped by state
  www.dsireusa.org

For More Information

For more information on Missouri wind energy issues, contact:

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