Small Wind Resources for Electric Co-ops from NRECA

Bob Gibson, Senior Program Manager
Cooperative Research Network

May 20, 2009

NRECA CRN COOPERATIVE RESEARCH NETWORK

BUSINESS AND TECHNOLOGY SOLUTIONS FOR ELECTRIC COOPERATIVES

NRECA's Cooperative Research Network monitors, evaluates and applies technologies that help electric co-ops control costs, improve productivity and enhance member/customer service.

RESEARCH AREAS ...

END USE SOLUTIONS »

Evaluate consumer services and technologies that can improve energy efficiency, increase comfort and satisfaction, and lower costs.

RENEWABLE ENERGY & DISTRIBUTED GENERATION »

Increasing knowledge of emerging renewable and alternative energy technologies to ensure innovative use based on sound business decisions.

INFORMATION & DIGITAL COMMUNICATIONS TECHNOLOGY »

Evaluating emerging technologies for consumer use and utility value

TRANSMISSION RELIABILITY & SECURITY »

Addressing capacity demands and mitigating security vulnerabilities and risks.

DISTRIBUTION OPERATIONS BEST PRACTICES »

Balancing operational effectiveness and cost control in all aspects of engineering and operations..

GENERATION, FUELS & ENVIRONMENT »

Helping ensure the continued use of abundant coal resources as a cost-effective power supply in compliance with environmental regulations.

WHAT'S NEW ...

CRN successfully tests a low-cost way to measure mercury emissions. More >>

Integrated outage management systems speed repairs & improve communication. More >>

Catch up with CRN activities through **E Update**, CRN's bi-monthly email. »

TechSurveillance Magazine

A Journal for CRN Members January, 2006

Toyota-Backed Micro-CHP Conducts U.S. Field Demos | Story >>

NERC Standards Increase Clarity and Accountability | Story >>

Co-op Joins Elite Group of Small Utility-Scale Wind Developers | Story >>

DG Interconnection Toolkit

- A Business and Contract Guide for Interconnection (UPDATED) to help cooperatives and their employees move smoothly through the interconnection process.
- Consumer Guidelines for Interconnection (UPDATED) to educate consumers about the interconnection process.
- A Model Interconnection Application (UPDATED) to be filled out by consumers interested in installing their own generation.
- A Model Short Form Interconnection Contract (UPDATED) for consumers installing DG units at < 10 kW capacity.
- A Model Long Form Interconnection Contract (UPDATED) for consumers installing DG units with a capacity of 10 kW to 10 MW.
- A DG Rates Manual (UPDATED) to help each cooperative think through the issues required to design a rate that meets that cooperative's specific goals; and,
- A Technical Application Guide (UPDATED) that provides rules of thumb that engineers at each cooperative can apply to develop detailed technical interconnection requirements that work for their system.

DG Interconnection Toolkit

- Distributed Generation White Paper (UPDATED)
  Properly planned and operated DG can provide consumers and society with a wide variety of benefits, including economic savings, improved environmental performance, and greater reliability. The interconnection of DG with the electric grid continues to pose genuine safety and reliability risks and could also pose an economic risk to some electric utilities and their consumers. NRECA in this white paper seeks to provide an objective view of DG's potential.
- Net Metering White Paper (UPDATED)
  Net metering policies require utilities to pay self-generating consumers retail price for wholesale power. As a result, net metering can raise the cost of power for all of the utility's other consumers. Therefore, NRECA supports policies that encourage renewable energy without shift costs between consumers.
- Feed-In Tariffs Issue Paper

Cooperative Small Wind Guide

project 07-05

Contents

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Cooperative Obligations

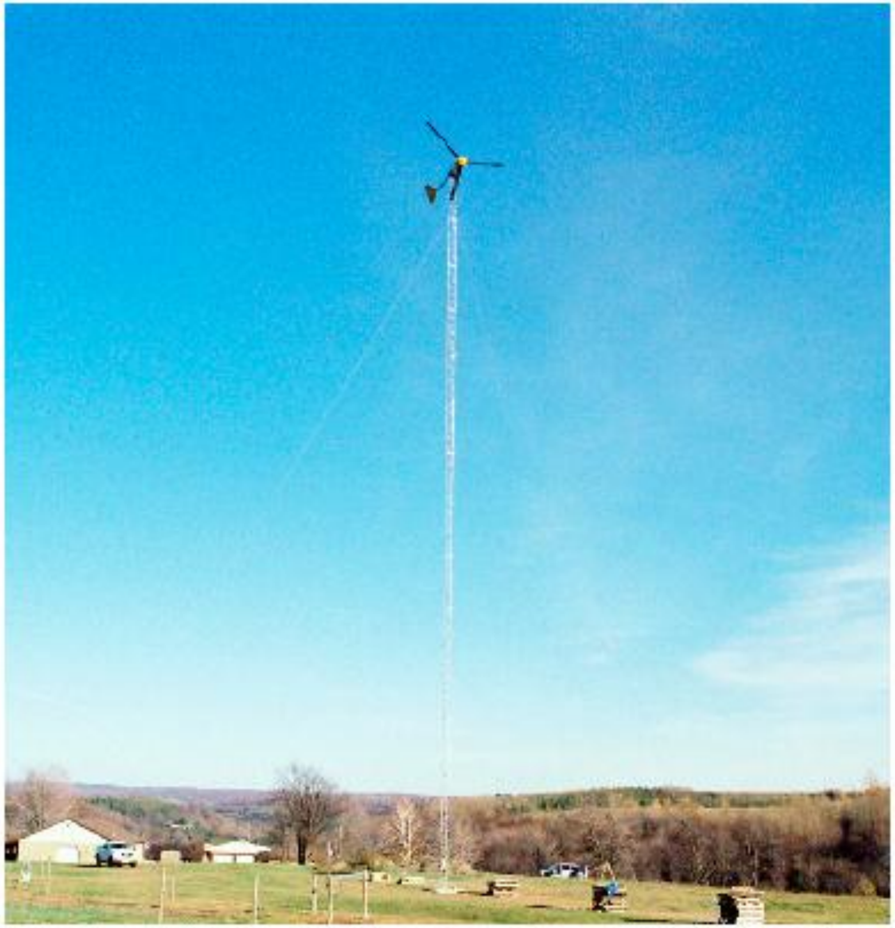
- Legal requirements under PURPA
- Self-governance
- Member satisfaction

Seven Co-op Case Studies

- Geographic range and range in turbine size (1.5 kW to 65 kW)
- Review cost-benefits from co-op and consumer-member
- Key takeaway: importance of maintaining an open dialogue and striking an agreement that works for all parties

Case Studies

John Bendickson's rebuilt 65 kW wind turbine produces more than enough electricity to meet his needs.



Francis Esposito installed his 10-kW wind turbine to reduce his electricity bill and set a precedent for renewable energy in his area.

Ten Frequently Asked Questions

7. What kind of payback can I expect in terms of breaking even?

Your cooperative can provide a capital cost recovery analysis worksheet that you can use to calculate the annual operating cost of your small wind system. The payback period for a small wind system can range from several years to several decades, depending on the cost of the system and the average annual wind speed at the hub height—the distance from the ground to the center of the turbine rotor. The average speed is often more critical to the payback period than the initial installed cost, according to some expert

You can also calculate the simple payback of a small wind system by the following formula, assuming the wind turbine is properly sized not to exceed your demand:

(Installed cost including interconnection costs and any necessary system upgrades, $) ÷ (kWh/y x Retail price of electricity, $/kWh – annual operation and maintenance [O&M] cost, $/yr) = years

The annual O&M cost may include insurance premiums, maintenance calls, service contracts, and the net present worth of long-term repairs.

Abundant Renewable Energy (ARE)

http://www.abundantre.com/ARE_Wind_Turbines.htm

Commercial availability: Two models, ARE 110 and ARE 442, available through dealers in 35 states.

Sales figures: n/a

States with commercial installations: Alaska, Colorado, Idaho, Iowa, Massachusetts, Michigan, Montana, New York, North Carolina, Ohio, Oregon, Texas, Utah, Vermont, Washington, and West Virginia.

Examples of actual installations (in addition to case studies): Two in Newberg, Oregon; two in Martha's Vineyard, Massachusetts.

ARE 110

Technical specifications:	
Rated power (kW)	2.5
Rotor diameter (in feet)	11.8
Swept area (in square feet)	110
Cut-in wind speed (mph)	Starts at 8 and runs down to 5
Rated wind speed (mph)	25
kWh/month at average wind speeds (kWh)	125 (8 mph); 275 (10 mph); 425 (12 mph); 575 (14 mph)
Peak output (watts)	3,000
RPM at rated output	280
Blade material	Molded fiberglass
Tip speed ratio	n/a
Cost (U.S. dollars)	$12,650 for grid-connected system, including wind turbine with slip rings, SMA inverter, voltage clamp, and resistor load; lightning protection system available
Years in production	2
Warranty (years)	5

ARE 442

Technical specifications:	
Rated power (kW)	10
Rotor diameter (in feet)	23.6
Swept area (in square feet)	442
Cut-in wind speed (mph)	Starts at 8 and runs down to 5
Rated wind speed (mph)	25
kWh/month at average wind speeds (kWh)	625 (8 mph); 1,175 (10 mph); 1,825 (12 mph); 2,500 (14 mph)
Peak output (watts)	12,000
RPM at rated output	160
Blade material	Molded fiberglass
Tip speed ratio	n/a
Cost (U.S. dollars)	$39,600 for grid-connected system, including wind turbine with slip rings, two SMA inverters, voltage clamp, and resistor load; lightning protection system available for $2,500
Years in production	2
Warranty (years)	5

Consumer Handout Packet

SECTION 5

Consumer Handout Packet

You may want to include some or all of the information in the Small Wind Basics section of this guide. The packet of information that you prepare for member-consumers should include a letter from your cooperative. In addition, the Frequently Asked Questions and Vendor List, provided in this guide, should be part of the consumer handout packet. Additional documents—capital cost recovery analysis worksheet, steps to a small wind system, and questions to ask wind turbine vendors—are provided in this guide.