

Making Everything Easier!™

# Wind Power

FOR  
**DUMMIES**®

## Learn to:

- Evaluate wind power's viability in meeting your household electricity needs
- Calculate the return on your wind-power investment
- Find the best wind-electric experts to help you with the job
- Understand the components and configurations of home wind-electric systems

**Ian Woofenden**

*Wind-electricity user, consultant, and instructor*



# Wind Power For Dummies®

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## About the Author

**Ian Woofenden** began exploring renewable energy as a preteen growing up in the Midwest, where he built a solar greenhouse, used a clothesline, and walked, ran, and bicycled extensively. Later, when he was a teenager in New England, his parents had a solar hot water system, and he read widely on sustainability, renewable energy, and country living. After marrying his college sweetheart and going on a 1,200-mile honeymoon on a tandem bicycle, Ian lived in a tipi in Maine and on an island in Lake Michigan before settling on an island in the inland waters between mainland Washington state and Vancouver Island, Canada. There, he and his wife bought 10 acres of off-grid property and began an experimental life with country living and renewable energy that has now spanned almost three decades. Raising a large family off-grid had many lessons to teach, and running a production woodcraft business for 14 years was challenging and instructive, too. Starting with an automobile battery and a few taillight bulbs, Ian's renewable energy systems have grown to include three wind generators, multiple solar-electric systems, two solar hot water systems, wood heating, extensive gardens and

orchards, and again, clotheslines. Ian's favorite mode of transportation is a bicycle, and a solar recumbent tandem trike may be in his future. Ian comes to renewable energy first and foremost as a user and abuser, an experimenter and active learner. In the early 1990s, Ian decided to pursue this passion as a career and began to take workshops offered in Colorado by Solar Energy International (SEI). A year later, he was coordinating workshops in the Northwest for SEI. Three years later, he landed a job as an editor with *Home Power* magazine, his all-time favorite publication. Today, Ian is one of the senior editors at *Home Power* and is Northwest and Costa Rica Coordinator for SEI, organizing and co-teaching 8 to 10 weeks of workshops per year. Ian is author of numerous articles on wind energy and other renewable energy topics for *Home Power* and other publications, and he is one of the supporting coauthors of *Power from the Wind* by Dan Chiras. He also teaches wind-energy workshops for other organizations and does private consulting for individuals, businesses, and organizations. He particularly enjoys teaching and consulting in Central America, where he spends several weeks each winter. With his family mostly grown, Ian is excited to see some of his kids involved in renewable energy and environmental education. His family homestead is still an experimental lab where new products are tested and new lessons are learned. If he hasn't already overcommitted himself, Ian likes to correspond with readers at [ian.woofended@mindspring.com](mailto:ian.woofended@mindspring.com)

## Dedication

This book is dedicated to my seven children, who have the capacity to change the world they live in by changing

themselves and the way they live; my wife, who has lived with my wind-energy addiction for lo these 31 years; my parents, who taught me by example to think for myself, read, write, and care about the important things in life; and my many friends, supporters, readers, and students, who have discussed, laughed, cried, critiqued, and ranted with me over the years.

## **Author's Acknowledgments**

As an editor, I have been intimately involved in shaping others' writing, and I know from experience that no one is an island. Anything produced is the result of collaboration on many levels. I stand on the shoulders of others who have been working in the field much longer than I and on those I have shared space with in foundation holes and on top of towers in 25 mph winds. In particular, I'd like to recognize the following: Hugh Piggott has been a source of much information, experience, and perspective for many years. I appreciate not only his technical savvy but also his humility and generosity. Having him as technical reviewer on this book is another high point in a long trail as friends and colleagues. Mick Sagrillo is gradually leaving huge shoes to fill, and I appreciate his willingness to share his knowledge, his recommendations, and his time. As mutual thorns in each other's sides, being around the two of us has been said to be "worth the price of admission." Paul Gipe is a model of straight-up journalism, and he knows more about more wind generators — large and small — than anyone else I know. He calls a spade a spade, and for that I have great respect. Other renewable energy colleagues who have

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natural resources more wisely. While I'm appreciative of all that these many people have contributed to my life and ultimately this book, responsibility for errors, missing info, and my ever-present personal biases is mine, all mine. Life is imperfect and short; take what you like and leave the rest.

# **Publisher's Acknowledgments**

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# Introduction

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Wind energy is without a doubt the most difficult renewable resource to capture. At the same time, it often ends up being the most attractive. Should you be discouraged by the difficulty of the job? No! But if you don't take the difficulty seriously, you will be disappointed. In my many years of working with wind-electric systems, I've seen many, many problems and failures. Some of these were due to equipment design flaws or freaks of nature, but most were due to poorly designed systems and poor maintenance.

This book doesn't sugarcoat the technology or the industry. This is to your benefit! I suspect that your goal is the same as mine: a *successful* wind energy system that gives you electricity that's cleaner and perhaps less costly than what you're using now. Getting to that goal requires looking seriously at what it takes to generate electricity with the wind for the long haul.

Whether you come to this technology with environmental, financial, independence, or hobby motivations, you can get some or all of your home's electricity from the wind. The wind, driven by natural cycles, originating from the sun, is an abundant and renewable resource. Although you still have the capital and maintenance costs of any energy-generating system, you'll never pay a fuel cost on a wind-electric system. (And a *system* is what you need — not a single component but a wisely designed collection of components that work together to capture wind energy, condition it, perhaps store it, and make it usable to you and your neighbors.)

If you do your homework, find good partners, and design, install, and maintain a robust system, you'll be set up for years of satisfying energy. When the wind blows, you'll smile, knowing that it's working for you.

## **About This Book**

Many people have written books about wind electricity, several of which I use and recommend. This book focuses on a real-world, nontechnical approach to designing and installing wind-electric systems. I didn't write it to turn you into a wind-generator designer, a tower contractor, or an electrician. It's for homeowners who want to explore the possibility of using wind energy and want straight advice from someone with nothing to sell and a great deal of experience with what does and doesn't work.

You don't have to read this book from cover to cover; it's designed so you can dip into and out of any topic at any time. Read what you want, put the book back on your shelf, and bring it down again whenever you need.

If you decide to install your own system, you'll need more than this book. If you decide to hire the job out, you'll be well positioned to ask the right questions, scrutinize the answers you hear, and make wise choices about contractors and system design.

## **Conventions Used in This Book**

To help you navigate this book, I've established the following conventions:

**Boldface** text emphasizes the key words in bulleted lists and actions to take in numbered lists.

New terms in this book appear in *italics* and are explained in the text (and often in the glossary in Appendix A).

All Web addresses appear in monofont.

Some Web addresses may break across two lines of text. Where that happens, rest assured that I haven't put in any extra characters (such as hyphens) to indicate the break. When using one of these Web addresses, just type in exactly what you see in this book, pretending that the line break doesn't exist.

## What You're Not to Read

Please don't read anything that you think is boring or pushes your buttons. If my writing or opinion or the topic doesn't capture your imagination, move on! Each chapter is written to stand on its own, and there's no requirement to read it all or read in sequence. Also, any text preceded by the Technical Stuff icon or included in a sidebar (a shaded gray box) is extra, and you don't need to read it in order to understand the subject at hand.

## Foolish Assumptions

Some wit once said, “Assumption is the mother of all screw-ups.” I state upfront my basic assumptions about you so I can help you avoid making a mess. Here’s what I assume:

You are interested in successful wind-electric systems.

You want to know whether a wind-electric system is a viable option for your circumstances, and you want a solid grounding in the concepts and components of such a system.

You want your misunderstandings, myths, and fantasies about wind energy to be corrected. You’d rather hear straight talk than sales hype.

Your goals include cleaner, cheaper, or more local electricity.

You know that really valuable things cost — in time, money, and energy. In other words, you know that TANSTAAFL — there ain’t no such thing as a free lunch.

## **How This Book Is Organized**

This book is divided into six parts. As a strong advocate of not coloring between the lines, I encourage you to seek out the parts and chapters that you’re interested in and read them first. Here’s how the general topics are divided.