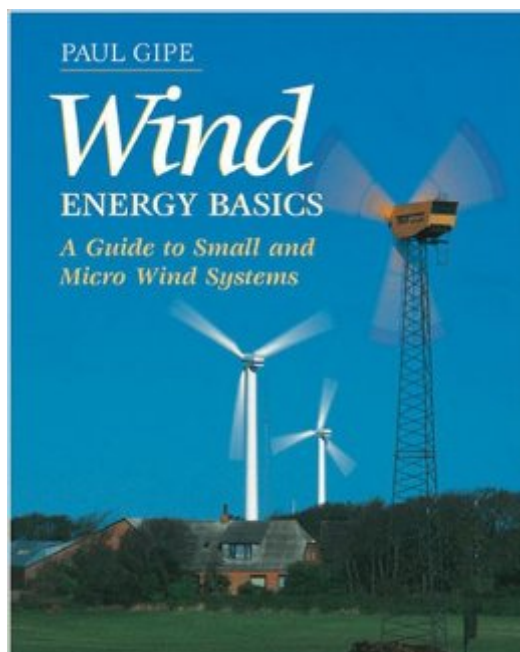


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# Wind Energy Basics: A Guide To Small And Micro Wind Systems



## Synopsis

The wind power industry has been transformed in the 1990s by dramatic breakthroughs in efficiency, economy, and adaptability. *Wind Energy Basics* is the most up-to-date source available of information about small wind systems. The book includes the unique "standard small wind turbine rating" developed by the author, which is designed to help readers wade through conflicting performance claims by manufacturers in the U.S. and overseas. Also included is detailed information on planning, siting, and installing a wind system, and on integrating wind power with solar for more cost-effective and reliable off-the-grid applications. In addition, Gipe provides a discussion of "net metering" and intertie possibilities, explaining how homeowners in many states can now sell their excess electricity back to the utility company. *Wind Energy Basics* is an excellent introduction to wind power for educational programs concerned with state-of-the-art renewable energy options, and will be indispensable for those considering today's generation of quiet, efficient, and reliable "micro" wind turbines. *Wind Energy Basics* describes a new class of small wind turbines, dubbed micro turbines, which are so small that they can be purchased for less than \$1000 and carried in your hands. The debut of micro wind turbines brings the technology within reach of almost everyone. These inexpensive machines, when coupled with readily available photovoltaic panels (solar cells), have revolutionized living in remote homes off-the-utility grid. And the increasing popularity of micro wind turbines has opened up new applications previously considered off-limits to wind energy, such as charging electric fences and powering remote telephone call boxes, once the sole domain of solar cells. Micro wind turbines have been around for decades for use on sailboats, but they have gained increasing prominence in the 1990s as their broader potential for off-the-grid applications on land has become more widely known. While micro wind turbines have yet to reach the status of widely available consumer commodities such as personal computers, the day may not be far off. The use of wind power is "exploding," say Karen and Richard Perez in their foreword. "There are currently over 150,000 small-scale RE (renewable energy) systems in America and they are growing by 30% yearly. The small-scale use of wind power is growing at twice that amount--over 60% per year," according to the Perezes, the editors of *Home Power* magazine. Southwest Windpower awakened latent consumer interest in micro wind turbines with the introduction of its sleek Air 303. Since launching the 300-watt turbine in 1995, Southwest Windpower has shipped 18,000 of the popular and inexpensive machines. "What Americans, and folks all over the world, are finding out," the Perezes say, "is that wind power is an excellent and cost-effective alternative" to extending electric utility lines, and fossil-fueled backup generators. *Wind Energy Basics* explains how it is possible—in some states—for homeowners to run their kilowatt-hour meter

backwards with a small wind turbine. This book confronts the common but controversial practice of "power rating" that may mislead consumers about the potential of some small wind turbines. Known for his frank style, Gipe quickly cuts through technological jargon and the hype surrounding power ratings. "Nothing tells you more about a wind turbine's potential than rotor diameter—nothing. The wind turbine with the bigger rotor will almost invariably generate more electricity than a turbine with a smaller rotor, regardless of their generator ratings," he says. Gipe also comes down hard on roof-top mounting. "Don't bother," he warns. "It's not worth the trouble." He also minces few words on mounting wind turbines in trees. "Sometimes wind energy isn't the right choice," Gipe says. "If you live in a forest of tall trees and you can't afford a tower tall enough to clear the trees, then wind energy isn't for you." Worldwide, wind energy is booming. Not since the heyday of the American farm windmill has wind energy grown at such a dramatic pace. By the new millennium, more than 40,000 medium-size wind turbines will be in operation worldwide, mostly in California, Europe, and India. These commercial wind turbines, including those found in California's giant wind power plants, will produce 20 terawatt-hours (20,000 million kilowatt-hours) of wind-generated electricity annually—enough to meet the needs of more than three million energy-hungry Californians, or twice that number of more energy-conscious Europeans. The commercial success of medium-size wind turbines, or wind farm machines, is only part of the story. Small wind turbines have found their role expanding as well. Whether it's on the contemporary homestead of Ed Wulf in California's Tehachapi Mountains, in the Chilean village of Puaucho overlooking the Pacific Ocean, or on the Scoraig peninsula of Scotland's wind-swept west coast, small wind turbines are making an important difference. While their contributions may be small in absolute terms, small wind turbines make a big difference in the daily lives of people in remote areas around the globe. Small wind turbines may produce only a few tens of kilowatt-hours per month, but this electricity goes much further and provides as much, if not more, value to those who depend upon it as does the generation of their bigger brethren. Today there are more than 50 manufacturers of small wind turbines worldwide, and they produce more than 100 different models. Altogether manufacturers in western countries have built about 60,000 small wind turbines during the last two decades. And tens of thousands more have been manufactured in China for use by nomads on the Mongolian steppes. Wind Energy Basics is richly illustrated with photographs of small wind turbines, from those on the Patagonian steppes at the tip of South America to those on the wind-swept shores of Denmark. The book contains information on most major small wind turbines on the international market. It also provides photographs of common wind turbine applications, including their use for wind power plants, vacation homes, third world villages, farms, water pumping, and so on. Engineers will like the

"exploded views" of popular micro and mini wind turbines such as the Ampair 100, Southwest Windpower's Air 303, and Bergey Windpower's BWC 850 and BWC 1500. The book also introduces the "griphoist" to American readers. This amazing tool, coupled with new lightweight wind turbine towers that have recently become available, has the potential to transform the installation of micro turbines. With the "griphoist", two people can safely raise a micro wind turbine on a specially designed tower without resorting to cumbersome electric winches. The appendix to Wind Energy Basics includes detailed product specifications for most popular micro and mini wind turbines, as well as sources for wind pumps (farm windmills), used wind turbines, anemometers, inverters, trade associations, and mail-order catalogs that sell wind turbines.

## Book Information

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## Customer Reviews

copyright 1999 by Mick Sagrillo Paul Gipe's latest book, Wind Energy Basics, was published just this month (June). It is meant to be a companion to two of Gipe's previous publications, Wind Power for Home & Business, and Wind Energy Comes of Age. While Wind Energy Basics is much slimmer than Gipe's prior tomes, this one is dedicated solely to home-sized and micro wind turbines. The text is richly peppered with photographs, schematics, and diagrams, all meant to stimulate the imagination of the reader. While not strictly a "how to" manual, there is enough motivating information included to keep a do-it-yourself wind aficionado busy for years. Gipe begins with the usual chapters on wind fundamentals: power available in the wind, estimating performance, and a brief review of the technology. Of particular value are the photos of the dozens of commercially

produced small turbines available from manufacturers worldwide. While pictures of these turbines can be found elsewhere, they rarely appear with actual people in them. Gipe's photos lend a sense of scale to the reader, helping the novice get some idea of exactly what she or he is getting themselves into. Gipe then proceeds to chapters on off-grid applications and utility intertie systems. Again, Gipe does a good job of introducing the reader to what is possible. But because of the detailed complexity of such installations, *Wind Energy Basics* merely whets the reader's appetite for these topics. Anyone interested in delving deeper into the how's and why's of off-grid and utility intertie installations should proceed to *Wind Power for Home & Business*. The chapters on siting, safety, and actually making a purchase give the reader a number of good tips worth remembering. My copy of *Wind Energy Basics* was immediately highlighted and "red-inked" as I went through these sections. There are several tables with realistic costs for the turbines, towers, and balance of system components. Since the book is geared towards the do-it-yourselfer, installation labor costs, the most nebulous cost to pin down in any home wind system, are not included. The chapter on installing a small wind generator focuses on guyed tilt-up towers, ignoring the more usual freestanding or guyed lattice towers used on larger wind turbines. This was judicious on Gipe's part since the widespread use of small wind systems, especially with the off-grid PV (photovoltaic) crowd is inversely related to the height of the tower that needs to be climbed. By including a good photo sequence of his own tilt-up tower installation, Gipe is sure to instill confidence in the installation of a wind system by the most squeamish of non-climbers. Finally, the appendices, unlike those of many other renewable energy books, are actually full of useful information. Gipe details the design characteristics of dozens of small and micro wind generators. In addition, all of the manufacturers contact information is listed, saving the reader hours of hunting for addresses, phone and fax numbers, plus web sites and e-mail addresses. Limited to only 122 pages, *Wind Energy Basics* is unfortunately restricted in what it can present to the reader. However, Gipe does a great job with the pages available. While I've only had *Wind Energy Basics* for two weeks, I've already gone through it three times. *Wind Energy Basics* is definitely worth adding to your summer reading list whether you are planning on installing a small wind system in the near future or just interested in knowing more about micro turbines.

It has been a pleasure reading such a clear and optimistic book on one of my favourite subjects *Wind Energy*. Paul Gipe has over 20 years experience in the wind industry both as a practitioner and a commentator. This is evident in the no-nonsense way he covers the various aspects of wind systems for the small user. This book is a wonderful primer for all but the professional wind

enthusiast; in which case the companion volume *Wind Energy for Home and Business* (1993) weighing in at over 400 pages is the book of choice. The book covers everything from the fundamentals of wind energy; including lots of maths; through to the actual installation, operation and maintenance of the authors own wind system. In between are chapters on estimating the performance of the proposed wind system, on and off the grid applications and off course what to look for in buying a wind turbine for your home, weekender or boat. A very important chapter has been included on siting and safety. After all what is the point of having an environmentally responsible wind system if it is behind a tree or if you injure or kill yourself trying to install or operate the thing? Through out the book the reader is constantly treated to excellent photographs from the authors extensive global travels with his wife and companion Nancy Nies in search of wind turbines. You have access to the inside of manufacturing premises and to the top and bottom of towers and wind turbines around the world. In conclusion I commend this book to anyone who has an interest in the environment or Renewable Energy. Wind is the perfect companion to Solar Power and together they are changing the future for the better.

In *Wind Energy Basics*, Paul Gipe provides the reader with an informative and easy-to-understand guide to small and micro wind systems for the generation of energy. Gipe includes detailed information on planning, purchasing, siting, and installing a wind system, and explains the integration of wind power with solar photovoltaics for more cost-effective and reliable off-the-grid applications. Gipe also explains "net metering" and intertie possibilities, describing how homeowners and businesses in many states can now sell their excess electricity back to the utility company. *Wind Energy Basics* is a "must" for environmentally supportive advocates seeking to establish non-polluting energy resources for themselves, their families, and their businesses.

*Wind Energy Basics: A Guide to Small and Micro Wind Systems* by Paul Gipe is an excellent overview of wind power turbines both past and present. It also does an excellent job of acquainting readers with the major components of a Wind Renewable Energy (RE) system and the functions thereof. In the opinion of this reviewer, the book does what it is intended to do: provide an overview a wind-based RE system and give the reader a basic understanding of same. However, as other reviewers have noted that *Wind Energy Basics* is not for the technical mind. The title does lack the step by step, do it yourself instructions that one would need to put his own wind-based RE into operation. Those who are already familiar with wind-based RE systems and are in search of a complete nuts and volts guide will probably take little away from this title. A better choice would

probably be the more complete, much larger "Wind Power: Renewable Energy for Home, Farm and Business", also by Paul Gipe. ISBN 1-931498-14-8. At nearly 500 pages, I have yet to come across a more complete reference on the subject of Wind Power. All in all, Gipe's Wind Energy Basics: A Guide to Small and Micro Wind Systems is a good starting point for the homeowner who is considering the possibility of buying or installing an RE system for the first time. If you are not extremely knowledgeable about RE systems and are in search of a book that will introduce you to the components and technologies, Wind Energy Basics will serve you well.

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