



Renewable and Efficient Electric Power Systems

By Gilbert M. Masters

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Renewable and Efficient Electric Power Systems By Gilbert M. Masters

A solid, quantitative, practical introduction to a wide range of renewable energy systems—in a completely updated, new edition

The second edition of *Renewable and Efficient Electric Power Systems* provides a solid, quantitative, practical introduction to a wide range of renewable energy systems. For each topic, essential theoretical background is introduced, practical engineering considerations associated with designing systems and predicting their performance are provided, and methods for evaluating the economics of these systems are presented. While the book focuses on the fastest growing, most promising wind and solar technologies, new material on tidal and wave power, small-scale hydroelectric power, geothermal and biomass systems is introduced. Both supply-side and demand-side technologies are blended in the final chapter, which introduces the emerging smart grid. As the fraction of our power generated by renewable resources increases, the role of demand-side management in helping maintain grid balance is explored.

Renewable energy systems have become mainstream technologies and are now, literally, big business. Throughout this edition, more depth has been provided on the financial analysis of large-scale conventional and renewable energy projects. While grid-connected systems dominate the market today, off-grid systems are beginning to have a significant impact on emerging economies where electricity is a scarce commodity. Considerable attention is paid to the economics of all of these systems.

This edition has been completely rewritten, updated, and reorganized. New material has been presented both in the form of new topics as well as in greater depth in some areas. The section on the fundamentals of electric power has been enhanced, making this edition a much better bridge to the more advanced courses in power that are returning to many electrical engineering programs. This includes an introduction to phasor notation, more emphasis on reactive power as well as real power, more on power converter and inverter electronics, and more material on generator technologies. Realizing that many students, as well as professionals, in this increasingly important field may have modest electrical engineering backgrounds, early chapters develop the skills and knowledge

necessary to understand these important topics without the need for supplementary materials.

With numerous completely worked examples throughout, the book has been designed to encourage self-instruction. The book includes worked examples for virtually every topic that lends itself to quantitative analysis. Each chapter ends with a problem set that provides additional practice. This is an essential resource for a mixed audience of engineering and other technology-focused individuals.

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Editorial Review

Review

“This book is recommended reading to a wide audience, from engineering students, to working engineers wanting a refresher on renewable energy, to the lay person wanting to inquire deeper into electrical systems.” (*IEEE Power Electronics Society Newsletter*, 1 September 2013)

About the Author

GILBERT M. MASTERS received his PhD in electrical engineering from Stanford University and has taught courses there for over three decades on energy and the environment, with an emphasis on efficiency and renewables. He is currently Professor Emeritus in the Atmosphere/Energy Program in the Department of Civil and Environmental Engineering at Stanford University. He is the author of several books on environmental engineering and energy for sustainability.

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