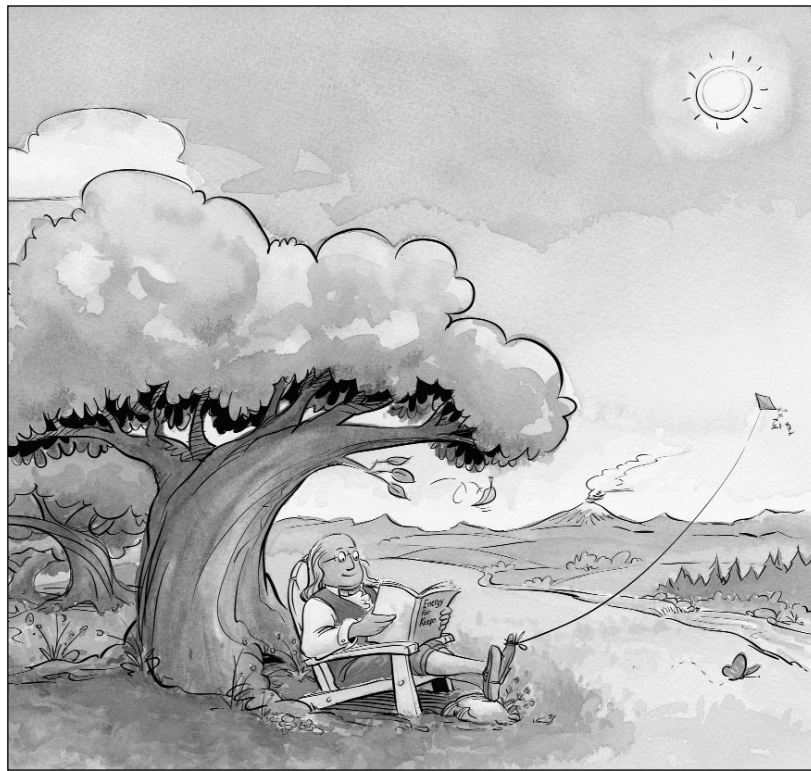


# **Energy for Keeps:** **Electricity from Renewable Energy**

An illustrated guide for  
everyone who uses electricity



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## ABOUT THIS PUBLICATION

**E**nergy for Keeps offers an introduction to renewable energy for everyone who uses electricity – from students to energy policy makers. This book will help readers understand energy issues that, more and more, loom large in our daily news.

The product of a collaboration, *Energy for Keeps* explains both renewable and nonrenewable energy resources, with an emphasis on renewables. It does not promote a particular technology. To ensure the book's accuracy, the authors interviewed and had drafts reviewed by experts from utilities, universities, state and federal agencies, national laboratories, power suppliers and industry. (See Acknowledgements, page v.)

On the accompanying website, **[www.energyforkeeps.org](http://www.energyforkeeps.org)**, readers will find edits and additions, reviewer comments, links to further information about energy and energy use, and more.

Aimed at furthering energy literacy for the general public, *Energy for Keeps* also serves as a great supplementary text for middle and high school students. Educators will find valuable tools on the *Energy for Keeps* website. Student activities and other supplementary information for teachers may be downloaded free and are also available on CD.

An earlier version of *Energy for Keeps* received the Interstate Renewable Energy Council's 2004 Innovation Award.

NOTE: Utilities, government agencies, and other entities may want to provide *Energy for Keeps* to their staffs and to public libraries, school libraries, and teachers. For details please contact the Energy Education Group.

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## **ABOUT THIS PUBLICATION (continued)**

### **THE ENERGY EDUCATION GROUP**

The Energy Education Group is a division of The California Study, Inc., a nonprofit 501(c)(3) organization based in Tiburon, California. Its expertise is in energy education with a focus on power generation. Its goal is to help people understand where our electricity comes from and how energy choices affect our lives, our environment, and future generations.

### **THE AUTHORS**

*Energy for Keeps* was developed and edited by Marilyn Nemzer, M.A., Chief Executive Officer of The California Study, Inc. Ms. Nemzer has been collaboratively producing award-winning energy education projects and materials for over 15 years. She serves on several state and national advisory boards that focus on energy and the environment and is a trustee of the Marin County Board of Education.

The lead writer of *Energy for Keeps* is Deborah Page, M.A., a teacher with over a decade of experience writing friendly semi-technical documents on renewable energy and energy conservation.

The technical editor is Anna Carter, an energy consultant who has worked in the renewable energy field for over 25 years, specializing in regulatory compliance, project permitting, and public information.

This talented team has worked together since 1992 to create quality energy education materials for both the general public and the classroom. They are committed to high standards of accuracy. Throughout the two years of research and writing devoted to *Energy for Keeps*, the team was assisted by over 75 experts in energy, engineering, and electricity generation.

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Lastly, we thank Kenneth Press Nemzer for his nonstop support and good advice on all aspects of the publication.

Marilyn Levin Nemzer, Editor

August 2005



## BENJAMIN FRANKLIN: AN INSPIRATIONAL FIGURE

**B**ENJAMIN FRANKLIN HOSTS THE PAGES of *Energy for Keeps*. We chose him not only for his contributions to the field of electricity, but also because he always sought, through hard work and ingenuity, to understand the world around him and to make a positive impact on it.

### BENJAMIN FRANKLIN: 1706 - 1790

The best-known story about Ben Franklin is that he experimented with electricity by flying a kite in a raging lightning storm. In reality he did not stand out in a storm (a soaking wet string could have made this experiment fatal), nor was he trying to have lightning actually strike his kite.

Ben had been studying electricity. He had correctly proposed that the sparks resulting from what we now call static electricity – an object of great fascination at that time – were due to excess electrical charges building up in an object and then leaping, or discharging, to an object of lesser charge. He speculated that thunderclouds, too, could build up excess electrical charges and that lightning was the discharge from the cloud to the ground (or other object such as a tree or house). He thought he could prove this theory by flying a kite just before a storm began (before the thunder, lightning and rain started), hoping to draw “fire” (electrical charge) out of the clouds.

So, one day in June of 1752, when a storm was brewing, he tested his idea. He placed a metal wire on a kite’s upper tip and tied a metal key to the bottom of the kite string. Standing in a shed as protection from the potential downpour, he flew his kite up into the dark clouds. When the fibers on his kite string began standing up, he gently touched the key and must have been pleased to feel an electrical charge. His experiment confirmed that thunderclouds generate static electricity. He also correctly concluded that lightning results from the build-up and discharge of excess electrical charges.

*(continued)*



## BENJAMIN FRANKLIN (continued)

Ben was not just an avidly curious scientist, but also a writer, a publisher, an inventor, a civic leader, and a statesman. He had his own print shop where he wrote and produced a newspaper and an annual almanac, among other publications. His many inventions include the lightning rod, bifocal glasses, the Franklin stove (a free-standing fireplace), and the odometer (which measures mileage). He began the nation's first lending library and the first fire department. He was Postmaster General of the American colonies. He contributed significantly to the writing of the Declaration of Independence and worked for the abolition of slavery. To top it off, his close diplomatic and scientific ties with Europe influenced France to support the colonial Americans during the Revolutionary War.

For his contributions to science and society, we are pleased to honor Ben Franklin as the host of *Energy for Keeps*.

### NEVER A DULL MOMENT

Life with Ben must have been pretty interesting. Imagine living with him while he was testing his new invention, the lightning rod. A metal rod on the roof attracted lightning, which traveled safely to the ground through a wire, sparing the house from fire. In one experiment, he threaded the wire right through the inside of his own house along the staircase banister. One stormy night the family awoke to the sound of bells clanging wildly. It turned out that Ben had attached metal bells to the wire along the banister, so that he would be alerted when electricity passed through to the ground.



# Energy for Keeps

