

## Introduction

**W**ELCOME TO THE REWARDING WORLD OF ENERGY EFFICIENCY! I have done my best to make this book informative, entertaining, and guilt-free, offering something in each chapter for both novice and expert. I think you'll find *The Home Energy Diet* a refreshing approach to what can be a dry subject. I commend you for reading about efficiency, but reading alone will not save energy — *action* will. So I ask that you really *use* this book, and in return I promise you appreciable dividends as you reduce your use of energy and trim your energy bills.

“I’ll start tomorrow.” How many times have you or someone you know said that about a diet? We know we should do it, we know it’s good for us, but we simply don’t like change, especially when we think it will hurt. Don’t lose another opportunity to save today by waiting until tomorrow! Energy efficiency starts with learning how to recognize a problem, making the right choices, and sometimes changing old habits. This book will help you become more aware of energy use in your home and in the world. I’ll help you put your home on an energy diet by showing you how easy it is to make realistic, cost-effective, energy efficient improvements, and by offering you a wealth of ideas to help reduce your use, lower your costs, and increase your comfort. You will succeed with this diet by keeping in mind my “Triple-A” approach to energy efficiency:

- Awareness of all the ways your home uses and loses energy.
- Assessment of your home’s energy requirements.
- Action taken to reduce energy consumption to a bare minimum.

Accomplishing these steps can have a positive impact on your lifestyle. I will not ask you to sit alone, shivering in the dark as some readers may remember being asked to do during the “energy crisis” of the 1970s. I think the difference

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between the 1970s and today is the difference between energy conservation and efficiency. Efficiency is taking advantage of modern technology to do the same thing better. An efficient compact fluorescent bulb can reduce power use by two-thirds and offer better performance over the old-style incandescent light bulb. Conservation is simply turning off the light. Efficiency measures allow you to do more with less, so you come out ahead in terms of cost, savings, and comfort.

Over the past 12 years, I've had the enjoyable job of performing energy audits in thousands of homes, new and old. I've been in all of your attics and basements, probed your flue pipes, and poked around in your refrigerators. I know the kinds of questions you have, I know what your concerns are, I know what kind of beer you drink, and I can put you on the track to energy savings. I've also been involved with renewable energy, having installed many solar electric and hot water systems, and built a half-dozen electric cars, so I can offer some advice about going "off-grid" (or disconnecting from the electric company). You can start a solar energy project as I did, with a single solar panel powering an off-grid room in your house. I now live almost completely dependent upon renewable energy with solar electricity, wood heat, and a biodiesel car. I live an extreme version of the message presented in this book because instead of buying conveniently pre-packaged energy, I am my own energy company, managing my own energy resources. The less I use, the less effort and cost I need to put into energy production.

Just as science continues to prove the health benefits of a proper diet, new forces are motivating us to save energy: dwindling and unpredictable fossil fuel supply, desire for security, stresses on personal and national economies, and pressures on social and natural environments. Energy efficiency is the first step towards a sustainable energy supply and lower pollution levels. Reduced resource consumption at home offers you greater independence, flexibility, and security along with lower energy bills, and will make your house a more comfortable place to live. I can't promise you this will be a painless process, but it will be worth your efforts, and you will feel better as you go along.

Location, amenities, price, schools, and possibly utility costs generally make it to the top of the prospective homebuyer's list. When you bought or rented

your home, did you ask about how the heat and hot water worked before you moved in? Was the furnace ductwork checked for costly leaks? Did you have the ventilation system tested to see if it actually moved air? How was the previous occupant's health?

Why are these things important? Energy-related problems are often masked as comfort issues. You may feel cold, dry, stuffy, or even sick inside your home. Indoor air quality is becoming a cause for concern as homes are being built more tight with better construction practices designed to be more energy efficient. Most of us spend up to 90 percent of our time indoors, yet are more aware of outdoor air pollution than of poor indoor air quality. How do you address these issues? We will examine how the systems in your home can work with and against each other to alter your home environment.

If I had to choose only one message to rise like cream to the top of my milk bottle full of advice, it would be that energy efficiency is an investment, not a hardship. The cheapest kilowatt is one you don't have to buy — a concept called *negawatts*. Studies show that the cost of buying efficiency is about half the cost of buying energy. Purchasing a product that uses less energy than another similar product has significant, long-term impacts on your energy consumption and costs. The price you pay to buy a new refrigerator, light bulb, or furnace is a small percentage of the price you will pay to operate it over its lifetime. Many of us look to banks or the stock market for retirement funds, but efficiency improvements offer cost-effective, tax-free returns that are greater than many traditional investments. Compound these returns by re-investing energy cost savings and you can begin building your energy savings account today. As energy prices rise, your savings increase.

This book begins with an overview of energy literacy that presents general information on how energy is measured, where it comes from, where it goes, and its impact on our lives. You can read the book in any order you wish depending on where you want to make improvements, but I recommend that you begin with Chapter 1 to learn the basics and then jump around from there. The chapters are organized in order of what you might find easiest to approach. The electrical use chapter comes first because many electrical efficiency measures are easily addressed. Using energy-efficient lights for example, is an

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easy thing you can do today that will cost-effectively reduce your electric bill. However, greater overall savings will likely be realized by focusing on areas that cause your home to use more energy for heating, cooling, and hot water. Some improvements may not be worth making unless you were going to replace the item anyway, or perhaps when you are renovating. A heating system is a good example: the cost to replace a properly operating, though perhaps old, furnace would not likely justify the expense unless it has an extremely low efficiency rating. When the time does come to replace it, then the incremental cost to buy an exceptionally efficient model is going to be well worth the energy savings you'll realize over the lifetime of the furnace.

I hope to dispel a few myths about energy use as well. You might be surprised to find that new windows are often at the bottom of the list of efficiency improvements. You'll see why in Chapter 6. Which uses more water, showers or baths? Should you leave your computer on all the time? Does it use more energy to do dishes by hand or in a dishwasher? Can your house be too tight? There are some very common problems built in to many homes, and by the time you're done with this book, you should be able to have an intelligent conversation with any contractor or salesperson who wants to work on your house or sell you a new appliance.

When someone asks me, "Do I use more power than average?" my answer is always: "It depends. Let's try to figure out what *your* average is, and then consider ways to reduce *your* energy consumption." "Average" is better thought of as an estimating tool. The ultimate outcome is for you to be able to detail your own specific energy situation and reduce your overall energy consumption through knowledge, awareness, change of habits, and investments in efficiency. With *The Home Energy Diet*, you will learn to dis-aggregate (pick apart, piece by piece) all your energy uses in order to build an energy profile of your home. This profile may vary seasonally, depending on whether or not you use heat, air conditioning, dehumidifiers, swimming pools, or other seasonal items.

Are you comfortable in your home? If not, try to describe your discomfort in detail: Are you too cold? Too hot? Is the house drafty? If so, where — around windows and doors, or maybe near the heat registers? Is the air too dry? Too humid? Stuffy? How does your house make you feel? Sleepy? Invigorated? (Anxious? Maybe the source of your discomfort is high utility bills). Do you

have icicles or ice dams in the winter? Icicles may look quaint, but they are a sure sign of wasted heat energy.

A home inspection by a good energy auditor can help you identify problems and sleuth out the mystery energy users in your home, but there are limits to what an inspection taking only a few hours can accomplish. If you want *all* the answers, the energy guy would need to move in and become intimate with your home, your habits, and your troubles. Short of giving up the spare bed, be prepared for the auditor to get personal with you — and tell the truth! We are not here to judge you or your habits, we are excited energy geeks who really want to know the answers and find solutions to problems. If we want to look in your fridge, it's not because we forgot to eat lunch, but because we want to size it up for potential energy consumption.

Throughout the book are fun short stories based on my years of experience as an energy auditor. There are several characters, but most all of them are named Ken and Connie Sumer (representing the great pastime of consumerism), who generally seem to do everything they can to unknowingly *increase* their energy bills. Like most homeowners, the Sumers don't know very much about energy; why should they? It's a specialty they haven't had time to learn about, and it's not as though houses come with an owner's manual. Yet we all want to lower our energy bills and reduce maintenance costs on our homes. If the technicalities get to be too much for you, read about the Sumers' energy misadventures for a chuckle, or at least for a practical, real-life point of view. These folks really are clueless though. The only reason they know the difference between the cat-box and the water heater is that they actually pay attention to the cat-box! Take the opportunity to really examine how your home operates.

If you have a head for math, the Math Box sidebars are for you. You don't need to read the Math Boxes to understand the point being made; they will just take you deeper into the heart of energy use and savings calculations if that's where you want to go. If you just want to know what to do now to save energy, skip right to the Energy Diet section in the appropriate chapter for a list of energy-efficient action items.

## Living with Solar

When I tell people I live off-grid in a solar-powered home, at first they may imagine a hovel — a dark, drafty, old log cabin with a lot of really weird gadgets cobbled together that they could never understand. A look of sympathy comes over their faces as if to empathize with my suffering. “Oh, that’s so neat,” they say, “but it must be so hard. I mean, how do you live without all the modern conveniences?” They go on about how the kids leave lights on and all that laundry, and they usually end up by concluding that they just can’t afford to make the change to solar living. It’s far enough out of the norm that they can’t picture what it would be like. “And besides, solar power doesn’t really work, does it?”

Eventually, some of these people brave the unknown and come for a visit. Immediately they notice that the house looks entirely normal. It’s your average home, nothing fancy, just 1,500 square feet of average. Then they notice the 19-cubic foot fridge, the clothes washer, dishwasher, microwave, TV, computer, lights, coffee grinder, hot and cold running water, and so on. “This isn’t what I imagined,” is the usual comment. “It looks so normal, and everything works!” As if I want to live in the dark ages. I enjoy living in the modern world as much as anyone else — most of all, I want my home and its contents to be simple and affordable, and to work well with a minimum of maintenance, just like everyone else does. My appliance-laden, solar-powered home uses about 80 percent less electricity than the average home, and about a third of this use is the refrigerator! We don’t suffer or deny ourselves any modern conveniences because it is getting easier to find very efficient appliances today.

If solar power can work here in cloudy New England, it can work almost anywhere, but you don’t have to “go solar” to have a low-energy home. Take advantage of the latest technology to live an energy-efficient, low-impact lifestyle. It gets easier every day, and there are far fewer excuses than there were ten or twenty years ago for being an energy hog.

You can take the concept of “off-grid” even further by heating your home and hot water with renewable fuels (wood) and producing or buying a renewable gasoline (ethanol) or fuel oil (biodiesel) substitute. Alternative energy is not the alternative anymore; it is the practical fuel of choice, and the only fuel we will use in the future.

You may think that individual savings measures are too small to bother with; instead, you’re looking for the one magic bullet that will shave a large part of your energy bill. It’s fine to go after the big things first, but there will be far more little things to do where the savings really add up. When you are finished reading this book, you will have the tools to determine where to spend your energy-improvement budget for the best savings. And for a comprehensive efficiency resource list, see <[www.homeenergydiet.com](http://www.homeenergydiet.com)>.

Follow a strict diet to avoid a fat fuel bill!