

INTRODUCTION



EVERY DAY, WE ARE BARRAGED WITH INFORMATION about global warming, global pollution, wars over energy resources, species depletion ... the list goes on and on. Tragically, most people — and certainly most governments — are doing very little about it.

This book tells some of the things we can do. First it talks about using technologies we already have to lower our energy consumption. Then it details renewable energy options for replacing fossil fuels and nuclear energy sources. It shows that as individuals we can change the world!

Most Americans don't think about their energy consumption very much. We don't think about the energy used to create our society or the energy required to produce the products we consume. We get our heating fuels automatically delivered to our homes. Our electrical energy flows to us through silent wires that are everywhere. It's all very easy and painless. Sure, we think about our energy consumption when we pay our bills once a month, or we think about it when we refuel our vehicles at the gas station, but in most cases we just accept these costs as inevitable. Our society uses a lot of energy, we want as much as we can get, and we want it cheap.

The United States consumes more energy per capita than any other country in the world. Other developed countries with similar lifestyles, and with equal Gross National Products, consume up to 50 percent less energy. We obviously have the technology today to use a lot less energy than we do. Some experts say that we can reduce our consumption by up to 75 percent today. They surmise that if we would put our greatest minds to the problem, we could do even more.

Lowering our energy consumption and using renewable energy would accomplish several things. Decreased use of fossil fuels and nuclear energy would have a positive impact on our environment by reducing carbon emissions that contribute to global climate change. It would also reduce the production of pollution that contributes to acid rain, nuclear waste, and other environmental contaminants. A more subtle result of these changes is that power would be transferred from the super-rich to the common people. The people who run the world are the people with the most money. Many of them get their money by selling fossil fuels. These are the people who control the governments and the mass media of the world. By reducing their power we decrease their influence and increase our personal freedom.

It is unlikely that we can look to governments for leadership in the transition to renewable energy that must be made. The changes will come from the bottom up. It is up to us to do what we can.

This book presents detailed information about solar thermal applications for homes and small businesses. Heating water with the sun may seem like a simple endeavor, and it is. Solar water heaters heat water using the energy of the sun. A solar water heating system is composed of a solar collector and a water storage tank. Depending on the type of solar energy system, there may be several other components as well. Most systems use pipes, pumps, system controllers, heat transfer fluids, various valves, heat exchangers, pipe insulation, and mounting hardware. Exact system components will be detailed in the following chapters as we describe the different systems available.

Of all the renewable energy options open to us, the technology of solar water heating is the most mature. It is an industry with proven technologies, established manufacturing facilities, and qualified and experienced technicians. These technologies and applications have been proven over many years and thousands of

installations. However, it took time for these technologies to mature. And during that time, we made some mistakes. Some of the technologies or designs that I have included in this book are bad ideas. I have included their descriptions so you can recognize them and know how they work if you are doing repairs. I have also included these descriptions because you may read or hear about a certain design, and you will want to know if it is good or not. Their descriptions should be used only for reference and maintenance.

It does not take a rocket scientist to design, install, or use a solar water heater. While it is simple, certain factors must be taken into consideration to ensure satisfactory reliability and performance. The single most important consideration is your climate. Others include the hardness of your water, hot water demands (the load), aesthetics, specific location factors like trees, shading, and mounting options, availability of components, and price. With over 20 years of experience designing, selling, installing, and servicing solar water heaters, I have found that most systems work great for a very long time. Problems that do occur are generally caused by either poor quality components, the wrong design or components for the climate or specific situation, or poor workmanship. The bottom line is that if you choose the right system for your climate and install it properly, using quality components, you will end up with a renewable energy system that will most likely last you for the rest of your life. It will end up being one of the best investments you ever make.

The next chapter, a short history of solar energy, puts into perspective how we got to where we are today. As you read about the history of solar energy technologies in Chapter 1, you will see that the largest application of these technologies in the world has been in solar water heating.