HOW TO CUT YOUR ELECTRIC BILL IN HALF!

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What You Can Do

Ratepayers wring their hands in frustration because they feel there is nothing they can do to combat high electric bills. They are wrong. Although it is true that we need electricity to do various tasks around our homes, we actually require far less electrical power than we currently use. Many people around the country are beginning to realize that there are simple, cheap ways to save on electricity and that in some cases the switch to alternative fuels and new equipment can save them substantial amounts of money over the long run.

The purpose of this book is to show you-the ratepayer--how to simply and inexpensively reduce your electric bill by half. I originally decided to write this book because many friends and neighbors were paying three and four times as much as I was for electricity each month. In my area, the electric rate was over 11C per kwh and the average bill was running $72 per month. My bill was $25 to $30 per month for a family of four. People would ask me if I sat in the dark, did I have a TV, perhaps a root cellar instead of a refrigerator? Was I cold in winter?

My quality of life was in fact equal to theirs. I lived in 1,600 square feet of well-lighted space, stayed warm in winter and cool in summer, took a hot shower every day, and had two televisions. I lived as well as my neighbors did, but I used less electricity to maintain my lifestyle. You can also live well while spending less each month for electricity than you do now. Much less.

For a small, once-only investment of about $100, a typical family can reduce its overall electricity consumption by 25 percent without any adverse impact on its standard of living. A moderate investment of $400 to $500 can bring you a permanent 50 percent reduction in the consumption of household electricity, without hurting your lifestyle. This modest investment will normally be returned to you in savings within two years or less. In many regions of the United States, the payback would come in a year or less. Families with big-draw appliances can save up to 80 percent on the operation of these machines by using the conservation tips I offer in this book. Savings of 30 percent or more are easily achieved on refrigeration, cooking, lighting, and on the use of a number of smaller appliances--without having to replace existing equipment. Even greater reductions-50 percent to 60 percent--are possible in these areas over the long run by simply replacing existing equipment as it wears out with newer, high-efficiency models. The information I give you in this book should not only enable you to avoid the effects of rate shock, but it may also ensure that years from now you will pay no more for electricity each month than you do today.

It is important to become aware of the way you use electricity in your home. Cheap energy prices in the past and our national level of affluence have enabled most of us to pay little or no attention to our energy use. But at today's high rates, we need to acquire a sense of the relative costs of doing specific tasks electrically.

Energy Labels on Appliances

Air conditioners, water heaters, dishwashers, clothes washers, freezers, and refrigerator/freezers are now sold with energy labels that indicate the energy required to operate them. As the cost of electricity increases, the operating cost of an appliance becomes very important in your purchase decision. A new refrigerator/freezer that uses 1,100 kwh a year at 9c per kwh will cost $63 less to operate per year than a model of equivalent size that uses 1,800 kwh. If the efficient model costs $750 to buy, for example, and the less efficient model costs $550, the efficient model will earn back its additional purchase cost in 3 to 4 years. Over 15 years of operation--the average life expectancy of a refrigerator-- it should save you at least $1,000 compared to the cheaper model. So clearly, you should compare energy labels and save.

Energy Jargon

Several terms are used repeatedly in the following information.

The watt is a measure of electrical energy; the kilowatt-hour (kwh) is the consumption of 1,000 watts sustained over a 1-hour period. Thus, a single 100watt light bulb burned for 10 hours will use 1 kwh of electricity.

A British thermal unit (Btu) is a measure of heat energy. If 1 kilowatt is converted to heat, a will provide 3,412 Btu of heat energy. This is about as much energy as it takes to heat 7 gallons of water from 50"F (the temperature of incoming town or well water) to 120 F. One gallon of fuel oil provides 108,000 Btu of heat when it is burned in equipment that is 75 percent efficient.

R-value is a measure of the effectiveness of an insulating material. High R-values indicate a high resistance to heatfflow; thus, materials having high R-values hold heat well. Ceilings, walls, floors, and hot water tanks that are well insulated have high R-values and have much slower heat losses.

Heat loss occurs when a surface is poorly insulated or when it contains openings that allow heat to escape. Clearly, there is little point in heating an area that is poorly insulated; the heat will be quickly lost.

Heat load is the amount of heat a house requires. The load can be handled by a single heating system for example, a baseboard heating system might provide all the heat for a house. Or the load can be divided between two or more systems-for example, a house might have a baseboard heating system supplemented by a solar greenhouse or a wood-burning stove.

Payback period is the length of time it takes for your investment in conservation measures or in new energy efficient appliances to be returned to you in savings. If an insulating jacket for a water heater costs $20 and reduces your monthly electric bill by $10, it has a two-month payback period (20 divided by 10 equals 2)

Off-Peak Rates

There are several hundred electric companies in the United States, each with its own set of rates and charges. Most customers will pay a general rate per kilowatt-hour while customers with electric heat, electric water heaters, or all-electric homes (i.e., people who buy large quantities of electricity) often pay a somewhat lower rate. You should check your electric bill or call your electric company to determine what rate you pay. Make sure that you are paying the lowest rate allowable based on the amount of electricity you use.

You should also inquire about "off-peak" rates. Electric companies frequently charge higher rates during times when demand on their generating capacity is highest, and they offer lower rates when demand is low. They do this to discourage the use of electrical appliances during the "peak demand" periods. A utility must install sufficient generating capacity to meet the demand for power during the peak demand periods, plus a bit more (i.e., the utility must have some reserve capacity). This can mean investment in generating plants that have far more capacity than is needed most of the time.

The utility would much rather have a constant demand for its power and thus get optimal use of its equipment. &It from the customer's perspective, demand naturally rises and falls. A hot summer day is the time to use your air conditioner, and early evening is the time to take showers, wash dishes, etc. This basic conflict of interests led to the creation of two types of electric rates: on-peak rates (the rates charged during periods of peak demand) and off-peak rates (the rates charged during periods of low demand). If you can take advantage of off-peak rates, you will lower your overall electric bill.

Rates may rise and fall according to the season of the year and the time of day. Because high summer demand due to household air conditioning use can force electric companies to buy a power plant or two more than they would need during other times of the year, summer rates are often increased to help keep down demand and cover the extra plant costs. Reducing your electrical usage during the summer--for example, by using the low-cost cooling techniques discussed in this book instead of air conditioning-is thus a wise move.

Some electric companies also have various rates for various times of the day. For example, late afternoon and evening hours are usually high-demand periods, if you can avoid using much electricity during these hours and concentrate most of your electric usage in the morning and night, you could benefit from off-peak rates offered during the morning and nighttime hours. Bear in mind, however, that you must sign up for the off-peak rates--the utility company will not automatically give them to you. Also, if you do sign up for off-peak rates, your rates during the on-peak hours will go up.

Many electric companies do not offer off-peak rates to their customers, and many that do may require that you be a big user of electric power, say 1,000 kwh or more per month. In addition, off-peak billing usually requires that you have a special meter installed that will cost you at least several dollars extra per month. Nonetheless, gearing appliance use to off-peak rates can save you quite a bit on electricity bills.

A residential customer of Pacific Gas and Electric Company in the San Francisco area, for example, can take advantage of off-peak rates if he or she uses 12,000 kwh or more a year. During the summer months, on-peak rates are around 14c per kwh for the first 44 kwh used and 22c for each additional kwh. These rates apply to use during the hours from noon to 6:00 P.M. or peak rates, available from 6:00 P.M. to noon, are about 5.5c for the first 176 kwh used and about

8c per kwh thereafter. There are slight differences in the winter rates, but they follow a similar pattern with much higher rates charged during the on-peak period than the off-peak period.

A cost-conscious consumer could plan the use of many appliances to fit the lower-rate periods. Thus, timers could be attached to various appliances so that these machines would come on late at night. You might arrange for latenight water heating, dishwashing, clothes washing, and possibly even cooking. As a money-saving strategy it is an excellent approach. Check with your electric company to determine if off-peak rates are available to you.

Hot Water

According to the U.S. Department of Energy, a typical home uses 450 gallons of hot water per week. A conventional 52-gallon electric water heater requires 6,350 kwh per year to provide this much water at a temperature of 140 F. About 80 percent of these kilowatt-hours are used to heat the water directly; the remaining 20 percent are used to make up for standby losses (i.e.) heat lost from the water in the tank to the surrounding environment). At 9c per kwh, a typical family would spend $48 per month for hot water.

Basic Conservation Measures

If you carry out a once-only, low cost conservation program on your existing electric hot water system, you can save from 40 to 50 percent of your current expenditure for hot water. Here's how:

Step 1: Reduce the Temperature Setting

Locate the thermostat on your hot water tank, and if it is set higher than 130 F, set it back to 130 F. If your system has not been adjusted to a lower setting already, it is probably heating water to as high as 160 F.

Try the 130 F setting for a week; if it is satisfactory, try 120 F for the following week. If this is acceptable, keep the thermostat there or experiment with even lower settings. If your thermostat does not indicate actual degree settings, turn the dial down to the next lower level. For many families, a water temperature of as low as 110 F satisfactory. Automatic dishwashing may be problem at these lower temperatures, but as I point out later, this can be dealt with easily.

If your water heater has two thermostats, follow the same procedure, lowering the settings of them both. The upper thermostat should be kept at about a 10 F higher setting than the lower one. For example, if you set back the lower thermostat to 120 F, set back the upper one to 130 F.

Step 2: Insulate Your Hot Water Tank

Unless you own a new energy-efficient hot water tank, your tank is probably poorly insulated and, thus, its heat losses are apt to be high. For $15 to $20, you can buy a 1 1/2-inch-thick fiberglass tank jacket that is easily installed. It will reduce heat losses fairly well. I would recommend, however, that instead of using such a relatively thin tank jacket, you purchase a roll of 3 1/2- or 5 1/2-inch thick foil-backed fiberglass and use this as a tank wrap. It is simple to install. Just wrap it around the tank sides and top and tape it together with duct tape. Make sure the thermostat(s) and the pressure relief valve are not blocked. Also make sure the foil side of your insulation faces out. The cost is about $15 to $20, but the insulating ability of 5 1/2-inch-thick fiberglass is appreciably greater than that of a 1 1/2-inch-thick jacket.

Step 3: Use Flow Restrictors

At hardware and discount stores, you can purchase a number of devices that restrict hot water Row at the tap, faucet, and shower head. Flow restrictors costing as little as 10c to 50c have been marketed during the past several years, but most manufacturers have elaborated on these small devices in order to make more money.

The less expensive washer-type flow restrictors may still be available at plumbing supply stores. They are easily installed at shower heads and faucets by merely unscrewing the outlet ends, inserting the restrictors, and screwing the original hardware back together again.

Aerator restrictors--which mix air with the water-can reduce the flow of water by about 60 percent. You will probably not be able to detect the reduced flow except on your monthly electric bill. Aerators sell for $2 to $5 each.

Special shower heads that reduce hot water output by 60 to 70 percent are also available for $8 to $20. An overall reduction of 30 percent in household hot water use is Possible depending on the amount of reduction at each tap and the types of water-using appliances used within the household.

The above three-step conservation retrofit should require about 4 hours and an investment of $40 to $50. If you turn your water heater's thermostat from 140 to 130 F, wrap 3 1/2 inches of fiberglass insulation around the tank, and install flow restrictors that reduce hot water consumption by 27 percent-from 450 to 330 gallons per week, for example-you could reduce your electric hot water requirements from 6,350 kwh to less than 3,600 kwh per year. This is a reduction of 44 percent--a savings of over $250 per year. A turndown to 120 F, a 6 inch fiberglass wrap, and a flow restriction of 35 percent can provide an overall savings of 50 to 60 percent on water heating. Based on a $35 to $50 outlay, you can expect a payback period of two to three months on your investment.

The three steps we have described will save you a great deal of money. You may not wish to go on any further in pursuit of hot water savings. If so, fine--proceed to the next chapter and feel confident you have made a huge dent in your monthly water-heating bill. On the other hand, if you wish to save even more, read on.

Step 4: Put a Timer or Manual Switch on Your Water Heater

Chances are, there are times each day when you don't use hot water. In fact, you may use it almost exclusively within a very restricted period. Why keep heating it for 24 hours? Let's assume there are four people in your house. Two of them shower every morning and two others shower or bathe in the evening. Dishes are done after dinner each day, and clothes washing is done two or three mornings each week. It would seem that there is probably no need to heat water 24 hours a day-your family uses most of its hot water during specific times of the day.

A timer or manual switch spliced into your hot water system's power line would allow you to restrict the hours that you actually heat water. This does not mean there will be no hot water during the periods when the heater is off. Unless you drain the tank just before switching it off, there will always be some water that is at least lukewarm in the tank. If you have insulated your tank well, the loss of heat from this water, once power is shut off, will be very slow--the water will remain quite warm.

Not only will a timer reduce the number of hours your water heater will draw electric power each day, it will offer the added advantage of allowing you to heat water during off-peak periods. If your local electric company offers lower off-peak rates--and if you qualify for them--timing your hot water systems to operate during the off-peak hours is an ideal cost-saving strategy.

For most families, a timer is recommended rather than a manual switch. No one will have to remember to turn the water heater on and off at given times each day; the process will occur automatically. Timers cost from $15 to $40. They vary according to the wattage of your system and the number of on/off cycles that can be set for each day. Be sure to match the timer's wattage rating with that of your water heater. Timers are available at discount, home improvement, and hardware stores, and at electrical and plumbing supply outlets.

Step 5: Insulate Your Pipes

If your hot water pipes are located in an unheated basement or crawl space, you should insulate them. If you have 30 feet of copper hot water pipe under your house, for example, you may lose heat equivalent to about 170 kwh through them each year.

Pipe insulation kits are available. Most kits are overpriced for what you get, however. I would recommend that you purchase 3 1/2- by-15-inch fiberglass batts instead--the same product you can use to insulate your water tank. You may already have some extra fiberglass insulation around the house. Use it. Cut the fiberglass up the middle into strips 7 1/2 inches wide. Wrap each strip around the pipe--foil facing out--and tape or staple the seam together. The cost for insulation and duct tape will be about 20c per linear foot, or $6 to $7 to cover a 3-foot length of pipe. This will provide you with two to three times the insulating value of even the best kits and will cost less. You can save between 50c to 70c per foot of pipe each year for a one-time investment of 20c per foot. A $7 investment could save an average family about $85 during the next five years. The payback period should be three or four months. This is a 1,200 percent return! Note that the hot water pipes are found by going to your water heater and locating the outlet pipe that feels hot to the touch.

Step 6: Fix Leaky Faucets

Between 175 and 250 gallons of hot water ($3 to $5 worth) can be lost through drips each month. Old washers are almost always at fault, and they are cheap and easy to replace. Turn off the incoming water valve under the sink or in the basement. Use a wrench and screwdriver to remove the faucet. Remove the old washer, get a replacement of the same size at your local hardware store, insert it, replace the hardware again, and turn the water back on.

Step 7: Use Less Hot Water

There are several techniques you can use to reduce hot water consumption. A shower almost always uses less water than a bath, and with flow restrictors, the difference is even greater. Dishes can be washed by hand using as little as 4 gallons of hot water. Automatic dishwashers typically use 12 gallons or more of hot water and draw additional power for the electric drying element. Always be sure to fill clothes washers to capacity. A full load means more efficient use of hot water. For both dishwashing and clothes washing, rinsing with cool water will save you money.

Lighting

A typical American family consumes 1200 kwh or $108 worth of electricity each year to provide interior lighting. Because lights are widely dispersed and because bulbs vary in wattage, type, purpose, and life expectancy, reducing electrical use for lights seems a difficult task. Don't be misled, however. It is, in fact, relatively easy to reduce energy use for lighting, and a 40 percent savings can be made with minimal effort on your part. Understanding a few basic facts about lighting is an important first step to cost reduction.

The wattage of a light bulb is a measure of how much electrical power it will consume--not how much light it will give you. The brightness of a bulb or how much actual light you get is measured in lumens. The more lumens you get per watt, the more efficient your bulb. Both lumens and watts are given on the bulb package. if you do a little basic calculation (divide lumens by watts) when you buy bulbs, you will realize that efficiencies vary substantially. The more lumens per watt, the more light you will get for each watt of electricity you buy.

Higher-wattage bulbs tend to be more efficient (more lumens per watt) than low-wattage bulbs. A 75-watt bulb actually gives you 68 percent more light than three 25-watt bulbs, even though both use the same amount of power. A single 100-watt bulb gives off 20 percent more light than two 60-watt bulbs, and it uses less power. If you have fixtures with two or more low-wattage bulbs, converting to fewer, higher-wattage bulbs can give you the same amount of light while using less electricity. (Be sure not to exceed the acceptable wattage for a particular fixture. Some lamps, for example, are designed for 60-watt bulbs or smaller: putting higher-wattage bulbs in such lamps can be dangerous.) The greater efficiency of higher-wattage bulbs doesn't mean you should go around the house putting these bulbs in all the fixtures that are designed to accept them. On the contrary, people often overlight an area; conversion to lower-wattage bulbs is advisable. You currently have a 100-watt bulb in a hallway, for example, you might experiment with a less powerful bulb. A 75-watt bulb, even a 60-watt or 40 watt bulb, may provide all the light you need there. You will trade a slight decrease in illumination for a reduction in your electric bills. You should use this strategy throughout the house--it can lead to significant savings.

The life expectancy of a bulb should also be considered. Long-life bulbs are less popular now than several years ago, but they are still being sold.

Reflector bulbs are a less expensive way to provide household lighting. They are appropriate for illuminating a specific work area such as a kitchen counter, a sink, or a desk. They are 50-watt bulbs that cast light roughly equivalent to most 100-watt bulbs. Conventional bulbs transmit light energy in all directions, which is fine if your purpose is to light a large area. By comparison, the neck region of reflector bulbs is coated with a reflective surface so that virtually all of the light is beamed in one direction, thereby producing strong illumination for a relatively small area. Even with their high purchase cost, reflector bulbs are an ideal way to reduce electricity use. They run about 25 to 35 percent less in total cost per given amount of illumination than the other bulb types.

The most economical choice of all is the circular fluorescent bulb that screws into a conventional incandescent light fixture or lamp. The combined purchase price and operating cost of the incandescent options is approximately the same, but the screw-in fluorescent bulb provides light for about half this cost despite the extremely high purchase price of the bulb. The savings result from both the low wattage drawn by the bulb and from the long life expectancy of the bulb. Since the bulb can be used in regular lamps and fixtures, an additional savings comes from not needing to invest in special fluorescent fixtures, which are quite expensive. Fluorescent lights are far more efficient and long-lasting than standard incandescent bulbs. A 40-watt fluorescent bulb is twice as efficient as a 100-watt incandescent bulb, it gives more light, and it lasts up to 20 times longer.

If economics alone were the grounds for choosing fluorescent bulbs would clearly be the best option. However, most such bulbs provide an inferior form of cold light that is psychologically depressing. The flickering and the humming they produce cut their desirability so much that I am not willing to recommend them. Some studies even indicate that cell damage and cancer may be associated with their use. There are fluorescent lights now available that can provide a more balanced "full spectrum" light. This means they are warmer and less harsh on the eyes. They are designed to approximate natural light and help the body produce vitamin D in order to resist respiratory diseases. In the Soviet Union, these lights are used in schools to help children avoid colds. I personally do not use fluorescent lights, but if you feel comfortable with them, they can save you a great deal of money on your electricity bill.

Low-voltage incandescent bulbs are another relatively new option. These bulbs contain transformers or are connected to voltage-transforming devices. The transformers reduce 120 volt house current so that it enters the bulb at 5 or 12 volts. The bulbs themselves have small filaments and generate potent and controlled beams of light, suitable for illuminating work areas. However, in focusing light so well, the bulbs create a problem: they are somewhat hard on the eyes. Based on this drawback, low-voltage bulbs are probably less desirable than reflector bulbs.

Now that you know a bit more about light bulbs, here are some ways to save electricity when using them.

Basic Conservation Measures

Step 1: Use Daylight Whenever Possible

Nothing beats natural light for eye comfort. For daytime tasks such as reading, writing, studying, or sewing, a window can provide the ideal illumination. If you use electric lights during the day while keeping curtains or draperies partially drawn, consider how you might relocate various

activities and tasks to areas where daylight is available and how the amount of natural light entering the house can be increased.

Step 2: Turn Off the Lights

My wife grew up on a remote cattle station in Australia. Electric lights were operated from batteries that were charged periodically by a diesel generator. As the evening wore on, the batteries lost their charge and the lights gradually dimmed. A bulb needlessly left burning ultimately meant less light for someone to read by. If we could experience a week or two in similar circumstances, our electric light consciousness would be transformed forever.

As electric rates climb, we may become more sensitive to the cost of leaving lights on needlessly. If an area is to be unoccupied for more than 15 minutes, learn to turn off the lights. (Shutting off lights for shorter periods is not worthwhile since the energy savings will be offset by a reduction in the life of the bulbs. Turning a bulb on and off frequently is hard on the bulb's filament.)

Step 3: Install Light Dimmers

Household areas often lend themselves to different lighting levels at different times. An end-table lamp used for reading may require a 75-watt bulb, but 25 watts may be adequate when watching TV. A 60-watt bulb may be required over a kitchen counter during meal preparation, but 25 watts may be fine for providing minimal late evening illumination. Solid-state dimmers allow you to "turn down" your lights to suit the task and mood of the moment. These devices are inexpensive and also extend bulb life. (Do not use them with fluorescent lights, however--this could cause a fire.)

Step 4: Match Bulbs to Use

Ask yourself what task each lamp or light fixture in your house serves and consider the optimal bulb to meet that need. A desk light of 100 watts is probably too bright. Replace it with a 75 or 60-watt bulb or, better yet, with a 50-watt reflector bulb. Keep in mind that light-colored surfaces reflect more light, and shades that properly direct and reflect light allow you to get the most illumination from your bulb.

Overhead and ceiling lights are meant to provide general illumination rather than focused lighting for close work. You may find that, for most purposes, you really don't need high-wattage general area lighting. Instead, use a lamp to concentrate light on your work area and turn off overhead lighting.

Don't overlight. A 4-or 7-watt night-light will reduce electrical consumption.

So will a timer for security lighting: Instead of burning all day and night, your lamps will come on only during predetermined hours.

Step 5: Substitute More Efficient Light Bulbs

A single higher-wattage bulb is cheaper to use and more efficient than several lower-wattage bulbs. A frosted bulb provides more light than a soft white bulb of equivalent wattage. A 50-watt reflector bulb can concentrate as much illumination as a 10~watt standard bulb, yet it costs only half as much to operate. Use short-life, frosted, and reflecting light bulbs of the appropriate wattages--you'll save money.

Step 6: Clean Light Fixtures and Dust the Bulbs

Dirt absorbs light. A periodic cleaning around lights and fixtures means more usable lumens will get to where you need them.

Note: "Light buttons" plug into your existing lamp sockets. They are supposed to reduce power costs by 50 percent and extend bulb life. These little devices sell for $1.50 to $4.00 and present a fire hazard. They extend bulb life by reducing the amount of light produced by the bulb and actually have a negative impact on bulb efficiency. This means you'll pay more for less light. Don't buy them. Don't use them.

Another Option

Most daylight will enter your house through normal vertical windows, of course. But you may also want to consider installing a "window" or two in your roof. Daylighting via skylights offers some potential energy savings. Properly designed skylights that are oriented to capture some solar heat energy during winter months and that also act as summer heat vents can offer a cost-effective, psychologically pleasing source of direct and diffuse light to your home's interior. Their major disadvantage is winter heat loss during the night and on cloudy days. If they are fitted with convenient-to-operate insulating shutters, however, heat loss will be reduced, in which case skylights can be an effective supplement to electric lighting.

If you follow the information written here, you should be well on the way to lowering your energy bills. Good luck and enjoy the savings!