

Payback Time

By Linda Copman

Roughly half of our island families are spending a third or more of their monthly paychecks on housing expenses, such as electricity, according to the U.S. Census Bureau's 2006 American Community Survey. Stretched thin as we are to pay our monthly mortgage or rent, many can ill afford higher utility bills. This article explains life cycle costing and how to make *akamai* (smart), energy-efficient choices when you purchase water heaters, appliances and even light bulbs for your home.

The single largest electricity use in homes without central air conditioning is that consumed for heating water. On average, water heating accounts for 20-40% of household energy use. Replacing your conventional electric water heater with a solar water heater could conserve energy and save your family as much as \$85 per month on your electric bill. The Hawai'i County Energy Sustainability Plan recommends that "solar water heaters should be installed on every sunny roof."

Solar Water Heaters Quickly Reduce Your Utility Bill

Approximately 10% of households in Hawai'i County currently have solar water heating (SWH) systems, and there are a variety of attractive incentives to install a SWH system in your home. Hawai'i Electric Light Company's (HELCO) instant rebate of \$1,000 for solar hot water heaters significantly reduces the upfront cost. This rebate is part of HELCO's Demand Side Management (DSM) program. Federal and State tax credits are also available for SWH systems; in Hawai'i there is a 35% State tax credit (*up to a maximum of \$2,250*) and a 30% Federal tax credit.

To illustrate how these incentives can save you money, consider that while a 120-gallon solar water heater may cost \$7,000 to install, once you receive your \$1,000 rebate from HELCO, a State tax credit of \$1,750, and a Federal tax credit of \$1,500, your final cost is only \$2,750. When you factor in the \$70 to \$85 monthly savings on your electric bills, it is likely that you will recover your upfront costs for installing a SWH system in about three years, depending upon the size of the system and your family's hot water usage. After the initial investment is paid back, you continue to benefit from savings in your electric bill by as much as \$840 to \$1,020 per year.

An 80-gallon solar water heater tank, which serves households of one to four people, should pay itself off within four years under the right climatic conditions. A 120-gallon tank, which serves households of four to six people, can be expected to pay for itself in less than three years. Large systems require a greater initial investment, but they accrue more savings over time because of greater avoided electricity costs. Most SWH systems currently marketed on the island come with a full ten-year warranty on the solar panels and some companies warrantee the tank, resulting six to seven years of warranted operation remaining on your SWH system after it is paid off.

Household Appliances Go Energy Star

Household appliances account for another 20% of a typical household's energy usage, with refrigerators, washers and dryers consuming the bulk of this percentage. When shopping for appliances, it is worthwhile to consider energy efficiency right alongside with size, capacity, color and brand name. After all, how much the appliance will cost to operate each month will likely become more significant to you in the long run than whether you select a silver finish or a white one.

If you want to know how much it costs to operate a particular appliance each month, the Hawaiian Electric Company has developed the following simple formula you can use from the November 2008 Consumer Lines newsletter available at http://www.heco.com/vcmcontent/CorporateCommunications/ConsumerLines/HELCO_Consumer_Lines_Nov08.pdf.

“Step 1: Determine the appliance's wattage and convert it to kilowatts.*

___ Watts ÷ 1000 = ___ kilowatts

Step 2: Enter the average number of hours you use the appliance per month.**

___ Hours

Step 3: For the cost per kilowatt, assume 40¢ per kilowatt-hour. *(This fluctuates due to the monthly change in the cost of fuel.)*

Step 4: Calculate the operating cost by multiplying the results of steps 1, 2, and 3.

___ Kilowatts x ___ hours x \$0.40 per kilowatt-hour = cost to operate the appliance

Example: 145-watt 24-inch television

0.145 kilowatts x 120 hours x 0.40 per kilowatt-hour = \$6.96 per month

** The wattage of an electric appliance is usually listed on a metal plate or on the plastic covering on the back or bottom of the appliance. If only the amps and volts are listed, multiply the amps by the volts to get watts.*

** Electric motors are often rated in horsepower. One horsepower is roughly equal to one kilowatt.*

***Some appliances, such as refrigerators, water heaters, air conditioners, dryers, electric skillets, irons, and ovens, are controlled by thermostats that cycle on and off automatically. This type of appliance uses energy only when the heating element or motor is on. To figure its energy use you need to estimate the amount of time it is operating at full load.”*

Before you purchase a new appliance, there are two price tags that need to be factored into your decision. The first price tag is the initial purchase price. The second price tag is not as obvious: this is the cost of operating the appliance over the course of its lifetime. This second price tag is the one you will pay for every month for ten or more years, depending on the life span of the appliance. The operating cost will show up each month

as part of your electric bill. The average life span of a refrigerator is about 13 years, a washer is about 11 years; and a dishwasher is about 9 years. The purchase price can actually be considered as a down payment you make toward the full cost of operating a particular appliance over the course of its lifetime.

The Energy Star program was initiated in 1992 as a voluntary labeling effort to identify and promote energy-efficient products. The program is administered by the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). Energy Star labels are available in forty product categories, including home appliances, electronics, lighting, heating and cooling equipment, and office equipment. Energy Star products exceed the efficiency levels set by the Federal government. For refrigerators, which typically consume a greater share of energy than any other home appliance, Energy Star models use at least 10% less energy than required by current Federal standards—and 40% less energy than conventional models that were sold in or prior to 2001.

The savings for purchasing an Energy Star product, when calculated over the life span of a typical appliance at Hawai`i’s residential electric rates, are substantial. ***The payback times for the slightly higher initial purchase prices are usually less than one year.*** This is a small down payment to invest over the life cycle of the appliance. To calculate your energy savings for various residential appliances, visit the Energy Star Website at http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing#res_app.

Appliance	Annual savings		Lifecycle savings	
	Hawai`i	U.S. Average	Hawai`i	Mainland
Dishwasher	\$27	\$11	\$170	\$88
Clothes washer	\$123	\$55	\$694	\$147
Refrigerator	\$23	\$7	\$205	\$42
Air conditioner	\$158	\$48	\$1,453	\$424

Image: Some examples of the cost savings associated with Energy Star appliances in Hawai`i County versus the U.S. mainland. Image from the Hawai`i County Energy Sustainability Plan.

Energy Star Appliance at Work

Here is an example of how an Energy Star appliance can save you money in the long run. Consider that a typical household spends about 12% of its electricity costs on air conditioning. By spending about \$30 more up front to purchase an Energy Star qualified air conditioner, you could save a whopping \$1,115 in operating costs over the average nine-year life span of the unit. These cost savings are based on an electric rate of 39 cents per kilowatt hour, which approximates HELCO’s residential rate in April 2008. The payback time for making an initial investment of \$30 is a mere two months—a drop in

the bucket over the 108-month life span of the air conditioner. This amounts to a savings of 372% over the nine years, in addition to the 5,455 tons of carbon dioxide your energy-efficient air conditioner will not be spewing into the atmosphere when compared with the conventional unit.

Annual and Life Cycle Costs and Savings for 1 Room Air Conditioner(s)			
	1 ENERGY STAR Qualified Unit(s)	1 Conventional Unit(s)	Savings with ENERGY STAR
Annual Operating Costs*			
Energy cost	\$1,509	\$1,663	\$154
<i>Energy consumption (kWh)</i>	3,869	4,264	395
Maintenance cost	\$0	\$0	\$0
Total	\$1,509	\$1,663	\$154
Life Cycle Costs*			
Operating costs (Energy & Maintenance)	\$11,221	\$12,365	\$1,145
Energy costs	\$11,221	\$12,365	\$1,145
<i>Energy consumption (kWh)</i>	34,825	38,379	3,554
Maintenance costs	\$0	\$0	\$0
Purchase price for 1 unit(s)	\$300	\$270	-\$30
Total	\$11,521	\$12,635	\$1,115
		Simple payback of initial additional costs (years) [†]	0.2
* Annual costs exclude the initial purchase price. All costs, except initial cost, are discounted over the products' lifetime using a real discount rate of 4%. See "Assumptions" to change factors including the discount rate.			
† A simple payback period of zero years means that the payback is immediate.			
Summary of Benefits for 1 Room Air Conditioner(s)			
Initial cost difference			\$30
Life cycle savings			\$1,145
Net life cycle savings (life cycle savings - additional cost)			\$1,115
Simple payback of additional cost (years)			0.2
Life cycle energy saved (kWh)			3,554
Life cycle air pollution reduction (lbs of CO ₂)			5,455
Air pollution reduction equivalence (number of cars removed from the road for a year)			0
Air pollution reduction equivalence (acres of forest)			137
Savings as a percent of retail price			2%

Image: This energy savings calculator was developed by the U.S. EPA and U.S. DOE and is for estimating purposes only. Actual energy savings may vary based on use and other factors. Image taken from the Energy Star Website.

Energy Star Guide Label – Look for It

The Federal government now requires most appliances to display a bright yellow and black Energy Guide label. In addition to looking for the Energy Star label, you can read the Energy Guide label to help you decide whether an appliance is energy efficient. Although these labels will not tell you which appliance on the market is the most efficient, they do list the annual energy consumption and operating cost for each model, allowing you to make your own comparisons.

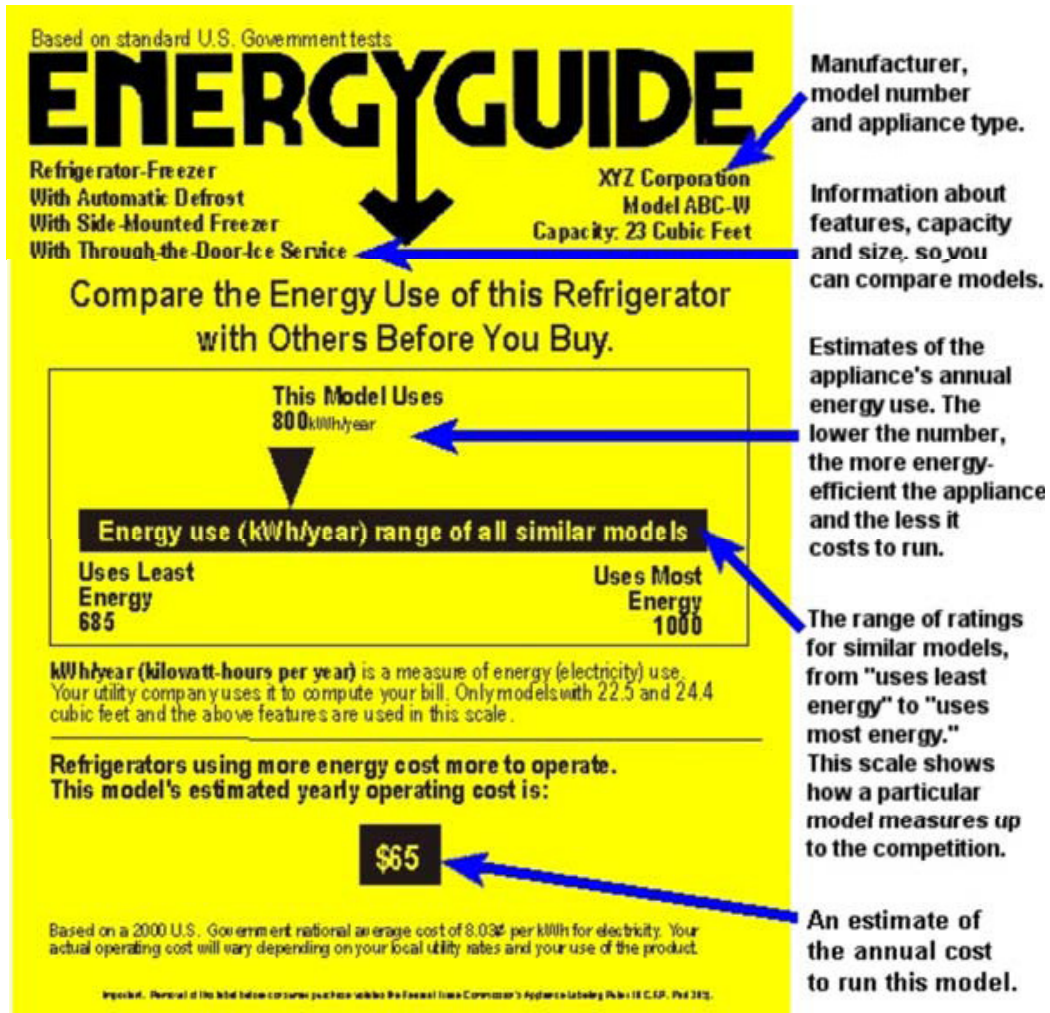


Image: Energy Guide label for an 800 kWh/year refrigerator-freezer unit at \$0.08/kWh. With the current average electricity costs on the mainland at about \$0.10/kWh, the average annual electricity cost of running this refrigerator is about \$80. In Hawai'i average operating costs for the same model would be about \$312 (*calculated at the current rate of \$0.39/kWh*). Over ten years, the cost to operate this refrigerator would be about \$3,120 in Hawai'i versus about \$800 on the mainland. Hawai'i County's higher electricity rates have the effect of amplifying the cost burden of energy inefficient appliances and the positive effect of energy efficient appliances. Image and caption from the Hawai'i County Energy Sustainability Plan.

When you read the fine print, you see that Energy Guide labels are calculated based on “a 2000 U.S. government national average cost of 8.03 cents per kWh for electricity.” If you multiply that cost by a factor of 4.9 to account for Hawai`i’s current residential electric rate of 39 cents per kWh, the annual cost of operating that particular appliance is nearly five times greater than the figure stated on the label. In Hawai`i, the Energy Guide labels grossly underestimate the cost of operating appliances. As a result, the cost savings for purchasing an energy-efficient model are greater in Hawai`i than they are in the 49 states where energy rates are lower than they are here. And the payback time is considerably shorter here than in other municipalities.

Appliances with higher Energy Guide ratings may have a higher initial purchase price, but their efficiency will repay that cost over and over again during their life span. To compare the energy performance of some highly rated energy saving appliances, visit the American Council for an Energy-Efficient Economy website at <http://www.aceee.org/>.

Energy Efficient Through Lighting

Probably the simplest thing you can do to make your home more energy efficient and save on your monthly electric bill is to replace your old incandescent light bulbs with compact fluorescent (CFL) bulbs. CFL’s last up to ten times longer than incandescent bulbs, they use only about one-fourth the energy, they produce 90% less heat, and they produce more light per watt. Although CFL’s cost 3 to 10 times more than comparable incandescent bulbs, they last 6 to 15 times as long (6,000 to 15,000 hours). The payback time for CFL’s can be as little as two months, and they can save you a few hundred dollars per year on your electric bill.






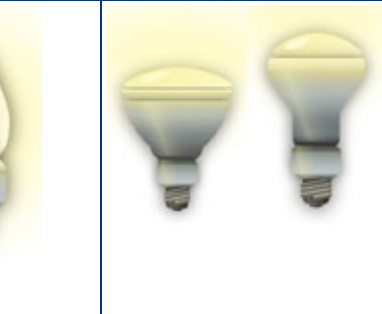
Bare Products		Covered Products			Reflector Products
Mini-Spiral or Twist	Tube or Universal	Incandescent/ A-line	Globe G25, G30, G40	Candelabra, Post or Bullet Shape	Indoor and Outdoor R20, R30, R40, PAR38
					

Image: CFL’s come in a variety of shapes and sizes. The majority of CFL’s are designed to look identical to their incandescent light bulb counterparts. The table above identifies

the most popular CFL shapes that are available, from the Energy Star website at http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_shapes.

How CFL's Work

CFL's work much like standard fluorescent lamps, they consist of two parts: a gas-filled tube and a magnetic or electronic ballast. The tubes generally last about 10,000 hours. CFL's are most cost effective and efficient in areas where lights are left on for longer periods of time. CFL's can be installed in regular incandescent fixtures, and because CFL's do not need to be changed as often as conventional incandescent bulbs, they are ideal for hard-to-reach fixtures. Note that although most CFL's fit into existing three-way light sockets, only a few CFL models can be dimmed.

According to the Hawai'i County Energy Sustainability Plan, a typical island household could save as much as \$380 annually, simply by replacing thirty 60-watt incandescent light bulbs with 60-watt equivalent CFL bulbs. This savings estimate is based on a 2006 electric rate of 32.7 cents per kWh. The current electric rate is about 39 cents per kWh, which represents a 19% increase in power costs. When you increase the 2006 estimated savings of \$380 by 19%, the 2008 savings for installing 30 CFL light bulbs in your home is more like \$452 per year.