

# ENERGY SMARTS: ENERGY EFFICIENT APPLIANCES

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The average American household spends more than \$1,500 per year on energy costs. New energy-saving appliances can reduce this amount by at least 30% (or \$450 for the average household). For example, by replacing a 20-year old refrigerator, it is possible to save \$85 per year on energy costs (EnergyStar, 2005). Not only will you save electricity, but also reduce air pollution and CO<sup>2</sup> emissions generated by coal fired power plants.

Major appliances can account for a large portion of your monthly energy bill. If you have older appliances (over 10 years old), you are probably paying considerably more per month in energy costs than necessary. To reduce these costs, there are two options: replace the old appliance with a new, energy-saving model, or practice energy saving techniques to reduce energy consumption until you can afford to buy a new one.

When thinking about replacing an old appliance, be aware that some appliances can give you a faster payback in reduced energy costs. This is especially true for refrigerators.

New appliances generally do not consume as much energy as older models (see Table 1). This is because they must meet certain Federal energy efficiency standards.

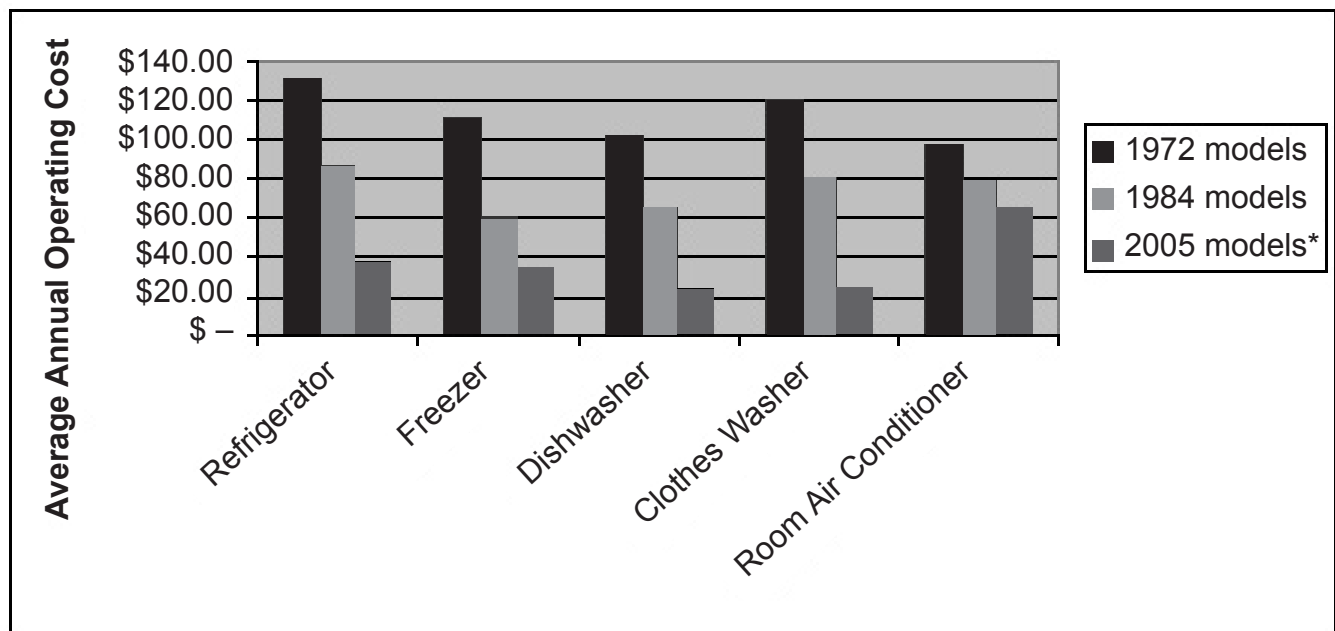
These standards have been tightened through the years, so generally the newer models are more energy efficient than the older models.

## READ ENERGY LABELS

There are two important labels that will assist you in evaluating the energy efficiency of an appliance, the EnergyGuide label and the EnergyStar® label. The EnergyGuide is sponsored by the U.S. Department of Energy and Federal Trade Commission. EnergyStar® is sponsored by the Environmental Protection Agency (EPA) and U.S. Department of Energy. Look for these labels when shopping for new appliances.

**EnergyGuide.** The law requires that the EnergyGuide label specify the loading capacity of the particular model, the estimated annual energy consumption of the model, the energy efficiency rating (for air conditioners, heat pumps, furnaces, boilers and pool heaters), and the range of estimated annual energy consumption, or energy efficiency ratings, of comparable appliances. The EnergyGuide label gives two important pieces of information you can use to compare different appliance brands and models: 1) the estimated energy consumption on a scale comparing similar models, and 2) the estimated yearly operation cost (based on the national average cost of electricity) (see Figure 1).

**Table 1. New Appliances Cost Less to Operate**



Sources: authors, adapted from Association of Home Appliance Manufacturers and American Council for an Energy-Efficient Economy, 2004

\*Refrigerator (Kenmore Top Freezer, auto defrost, greater than 21 ft.) \*Freezer (Kenmore Chest-style Freezer, manual defrost, 20.3 ft.)

\*Dishwasher (Viking, DFUD140) \*Clothes Washer (Whirlpool, CHW920 3.18 ft. capacity)

The Federal Trade Commission requires that appliance manufacturers put the EnergyGuide label on refrigerators, freezers, dishwashers, clothes washers, water heaters, furnaces, boilers, central air conditioners, room air conditioners, heat pumps, and pool heaters. Appliances not required to have the EnergyGuide label are cooktops, ranges, and clothes dryers.

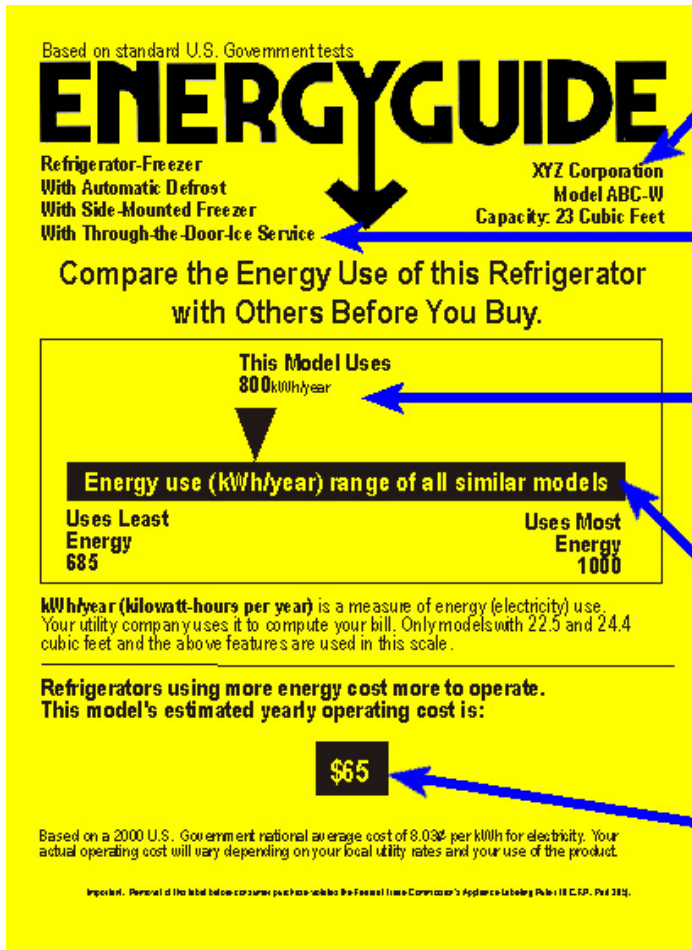
**EnergyStar®.** In 1992, the U.S. Environmental Protection Agency (EPA) introduced EnergyStar®, a voluntary labeling program designed to identify and promote energy-efficient products in order to reduce greenhouse gas emissions (see Figure 2). The EnergyStar® symbol is a simple way for consumers to identify products that are among the most energy-efficient on the market. Only manufacturers and retailers whose products meet the EnergyStar® criteria can label their products with this symbol. Choosing an EnergyStar® labeled product over a conventional model could save you hundreds of dollars in energy costs over the lifecycle of the appliance.

There is more to EnergyStar® than saving money. The use of energy-efficient products can also help save the environment. In many parts of the U.S., fossil fuels are often burned to produce electricity. The burning of fossil fuels is a major source of CO<sup>2</sup> and other greenhouse gas emissions, a leading cause of climate change and other pollutants that contribute to smog and acid rain. When you select energy-efficient products, less electricity needs to be produced. Thus, you are reducing emissions and promoting cleaner air as well.

### TOTAL APPLIANCE PRICE TAG

The total price tag not only includes purchase cost, but also operation and maintenance costs. Some appliances last longer than others (see Table 2). It is possible to save hundreds of dollars simply by choosing the most efficient model, rather than choosing the model with the lowest initial cost. To calculate your total price tag, use the Table 3 checklist.

Figure 1. EnergyGuide Label



Manufacturer, model number and appliance type.

Information about features, capacity and size, so you can compare models.

Estimates of the appliance's annual energy use. The lower the number, the more energy-efficient the appliance, and the less it costs to run.

The range of ratings for similar models, from "uses least energy" to "uses most energy." This scale shows how a particular model measures up to the competition.

An estimate of the annual cost to run this model.

difference in monthly utility bills. In the following section, specific appliances are reviewed along with some of the energy efficiency features found in these appliances.

## REFRIGERATORS

The refrigerator is used more than any other appliance in your kitchen. It is turned on 24 hours a day. Refrigerators are third in line on quantity of energy used, exceeded by heating and cooling systems and water heating. Models over 10 years old can use up to 50 percent more energy than newer models (EnergyGuide, 2005).

It is very important to choose the proper size refrigerator. Typically, the larger the refrigerator, the more energy it will use. When deciding which size of refrigerator to purchase, historically the rule-of-thumb has been a minimum

of 12 cubic feet for the first two people in the household, plus 2 more cubic feet for each additional person. Since people store more food in the refrigerator these days, they are purchasing larger refrigerators than in the past.

(Printed with permission from the Federal Trade Commission)

Figure 2. EnergyStar® Label



Money Isn't All You're Saving

(Printed with permission from EnergyStar®)

## KITCHEN AND LAUNDRY APPLIANCE ENERGY EFFICIENT FEATURES

Most new energy efficient features of appliances are found on the inside, in the motors, compressors, pumps, valves, gaskets and seals, or in electronic sensors that make appliances "smart and efficient." Even if two models look the same from the outside, they may have less obvious, internal features that make a big

Table 2. Life Expectancy of Appliances

Item	Life in Years
Refrigerator (electric)	15-20
Clothes Washer	8-10
Clothes Dryer	8-10
Dishwasher	8-12
Vacuum Cleaner	6-8
Toaster	6-8
Blender	15-25
Electric Fan	10-15
Hair Dryer	10-15

Adapted from: (CNYHomes, 2005)

**Table 3. Calculating the “Total Price Tag” of Appliances**

Energy Guide Rating (kWhs used per year)	kWh
[multiplied by]	
Appliance Life in Years (see Table 2)	years
[multiplied by]	
Local Electricity Cost per kWh	¢/kWh
“Utility Price Tag” Total	
[Add this to purchasing cost “Initial Price Tag”]	+
<b>Total Price Tag</b>	=

There are many options to choose from when shopping for a new refrigerator. There are side-by-side models, models with an upper freezer compartment, or with a lower freezer drawer. For families that require a lot of refrigerator space, there are the separate refrigerator and freezer units to be used together. In terms of basic configuration, a refrigerator with the compressor on the top and freezer drawer on the bottom is more efficient than most others.

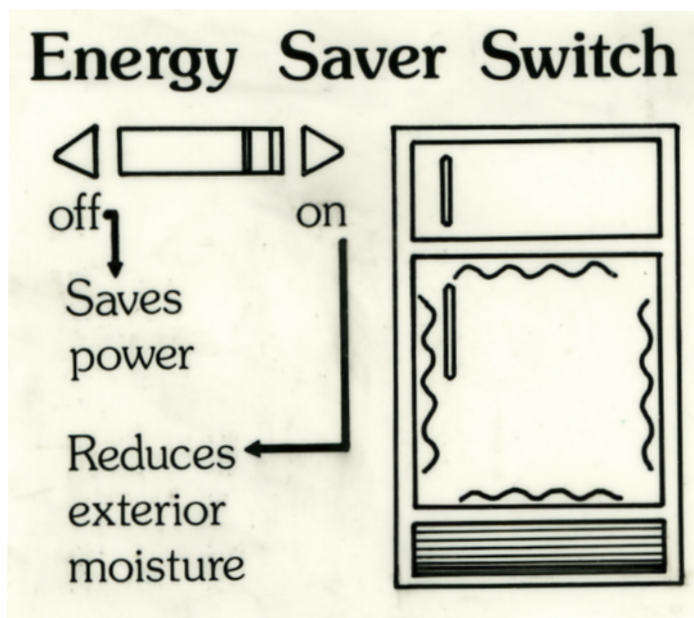
The refrigerator condensation coils can be located on the top, back or bottom of the refrigerator. Condenser coils mounted on the top of the refrigerator are more energy efficient because the heated air rises and escapes into the room, rather than heating the refrigerator body. Coils mounted on the bottom-front of the refrigerator are easy to clean, but tend to collect a lot of dust and must be cleaned about every three months. Bottom-back mounted condensers require less cleaning, but are difficult to reach unless the refrigerator is on rollers. It is important to keep condenser coils clean because dirty coils require more energy.

Upright freezers use 10 to 25 percent more energy than chest styled freezers because they lose more cold air when opened. Freezers that must be manually defrosted use 35 to 40 percent less energy than similar frost-free models. However, if the ice is allowed to build up more than ½" then the manual defrost refrigerator or freezer uses more energy (Austin Energy, 2005).

Select a refrigerator that has a tight door gasket and improved insulation. A tight door gasket keeps cold air in and warm air and moisture out. Some refrigerators have strong magnets on all four sides of the door to prevent air leakage and to keep the door tightly shut. One way to check the door seal is to notice the resistance when the door is opened. The more difficult it is to open the door, the tighter the door seal.

New refrigerators have improved insulation in their walls and doors, which lowers heat absorption from the room and reduces energy consumption. Look for extra-thick foam insulation, up to 2.7-inches in the freezer compartment, up to 2.2-inches in the fresh food compartment, and up to 1.5-inches in the door. For the same thickness, urethane foam is twice as efficient as fiberglass insulation. Many of the new refrigerators have automatic ice makers that increase energy costs by as much as 300 kWh per year (Hawks, 2000), or about \$24 a year at .08 cents/kWh.

**Figure 3. Refrigerator Energy Saver**



Some refrigerators have an energy saver switch located inside the refrigerator that can be shut off when humidity is low, thus saving energy (see Figure 3). The energy saver device is actually a heater which reduces moisture condensation. If used in dry environments such as Utah, it is actually an energy drain, and should be switched off.

When activated, heaters reduce moisture condensation, particularly around the freezer door, where moist air meets cold surfaces. If used continuously, the energy-save operation actually adds to energy consumption, therefore, it should be turned on only when moisture condensation is high.

## DISHWASHERS

The most efficient washers use less hot water, have energy-efficient motors, better spray arms, use sensors to determine the length of the wash cycle, and have controls for water temperature. The newest EnergyStar® dishwashers are 25 percent more efficient than the many other new dishwashers that do not have the label. At 25 percent, these dishwashers can save up to \$25 per year on energy costs (NRC, 2004). Improved washing action, spray arms, and nozzles reduce hot water use, and the energy cost of heating that water. Hot water use primarily determines the energy efficiency of a dishwasher, so it is important to choose models that require the least amount.

Washing cycle times and water consumption vary considerably between different models of dishwashers and can be checked by asking to see a machine's specification sheet, the instruction manual, or the model's use-and-care booklet. A normal heavy-duty cycle, including drying, can run anywhere from an hour to an hour and a half. Short cycles run 35 minutes to an hour. Water consumption varies as well. For some machines, the water usage is from 8 to 14 gallons depending on the cycle, on others from 6 to 11 gallons. Newer models of dishwashers are not only more energy efficient than older models, but they are also better at getting dishes clean.

A relatively new feature found in dishwashers is electronic touch control panel. These controls offer options previously unavailable, such as delay-start and diagnostic features. The delay-start option allows the dishwashing cycle to begin anywhere from 10 minutes to 9 hours later. This feature allows owners to take advantage of off-peak electric rates, run the dishwasher when there isn't a high demand for hot water, or simply when it is most convenient. When purchasing a new dishwasher, select one that offers different options such as "low energy option," "rinse hold cycle," or "air dry option." Look for models with internal "booster heaters"

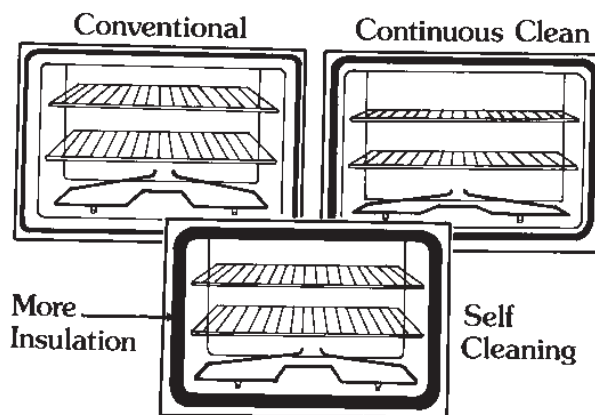
which permit lower household water heater temperature settings.

Washing options are very important in a dishwasher. They may include a low-energy option for moderate to lightly dirty loads, a regular wash for normal loads, and a rinse-and-hold washing option. Anytime you use less hot water, you save energy and money.

## OVENS AND COOKTOPS

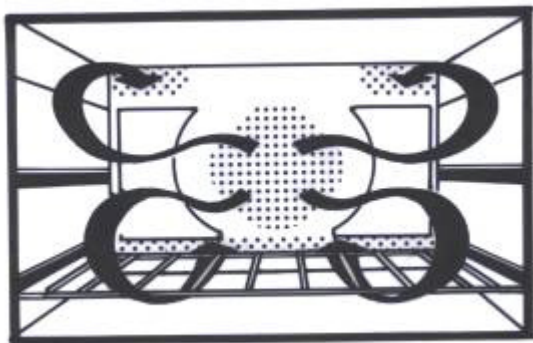
For cooking, consumers may purchase an oven and cooktop, or range. More households are using ovens and cooktops rather than ranges. A range contains both an oven and cooktop. A cooktop is a cooking unit mounted on the counter top. About 58 percent of American households cook with electricity, but gas ovens and ranges are making a steady comeback. Gas ovens use less energy when compared to electric counterparts because the fuel is used directly for cooking. Also in many parts of the U.S., gas is less expensive than electricity (HealthGoods, 2004).

*Figure 4. Ovens*



For ovens, electronic controls offer a variety of cooking timers that keep time from seconds to 4 hours or more. They have reminder options, automatic shut offs, buzzers or chimes, or warning lights to indicate completed cooking times. Electronic controls can be found on ranges, as well as cooktops and ovens. They may increase the initial cost of an appliance, but they are a good investment because they offer more precision. Timers help save energy because they prevent overcooking.

**Figure 5. Convection Oven Air Movement**



In terms of energy efficiency, a self-cleaning oven uses high heat during a cycle to decompose food soil and grease, therefore clean the oven when dirty. During the cycle, which is clock controlled, the oven door is latched and locked. A self-cleaning oven generally has more insulation in the walls than the conventional or continuous-cleaning oven; therefore, it saves energy when being used (see Figure 4). A self cleaning oven is a good choice because it uses less energy provided you do not use the self-cleaning option more than once a month.

One of the newest features found in ovens is convection cooking. It is available in portable, full-size, free-standing, and built-in wall ovens. In convection ovens, a fan blows the heated air over and around the food, increasing the rate of moisture evaporation, thus decreasing cooking time and saving energy. With convection cooking, you do not have to pre-heat the oven (see Figure 5).

### **CLOTHES WASHERS**

When choosing a new clothes washer, it is first important to determine the proper size washer. A small washer may be more appropriate for smaller households. But if you have a large family and have to do multiple loads and the clothes washer is too small for your family, you could be using more energy.

It is also important to choose a clothes washer that has multiple heat and water settings. This gives you the option of using less water for smaller loads. Choose a clothes washer that has the ability to select hot, warm, or cold water, water levels for the amount of clothing, and a fast spin speed that allows more water to be removed

after the washing, thus reducing the drying time and your dryer's energy use.

Front-loading washing machines are more efficient than top loading ones because they use less water and the cleaning action is better. Front loading washing machines use approximately one-third the energy and water compared to vertical axis machines (top loading). They also have a faster spin speed, which dries laundry better and decreases dryer time.

### **CLOTHES DRYERS**

Clothes dryers use an enormous amount of energy to dry clothes. In many areas of the country, gas dryers are more energy efficient than electrical dryers. Models are available which have an automatic moisture sensor that automatically shuts off the machine when clothes are dry, thus saves energy.

### **CONCLUSION**

When shopping for new appliances, one should always read the EnergyGuide and EnergyStar ® labels. It is also a good idea to calculate the second price tag, which includes the cost of running the appliance. Modern household appliances have more energy-saving options than ever before, including features which reduce energy and hot water consumption.

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