

ENERGY-EFFICIENT APPLIANCES

Selection and maintenance guidelines for major home appliances



Buildings for the 21st Century

Buildings that are more energy efficient, comfortable, and affordable... that's the goal of DOE's Office of Building Technology, State and Community Programs (BTS). To accelerate the development and wide application of energy efficiency measures, BTS:

- Conducts R&D on technologies and concepts for energy efficiency, working closely with the building industry and with manufacturers of materials, equipment, and appliances
- Promotes energy/money saving opportunities to both builders and buyers of homes and commercial buildings
- Works with state and local regulatory groups to improve building codes, appliance standards, and guidelines for efficient energy use
- Provides support and grants to states and communities for deployment of energy-efficient technologies and practices

POTENTIAL FOR SAVINGS

According to the 1997 Residential Energy Consumption Survey, lighting and appliances used 27% of all energy consumed in residences and accounted for more than 45% of the energy costs. Although these figures include energy use and costs for lighting and small appliances, a substantial portion of this use and cost is due to major appliances such as refrigerators, washers, dryers, dishwashers, and stoves.

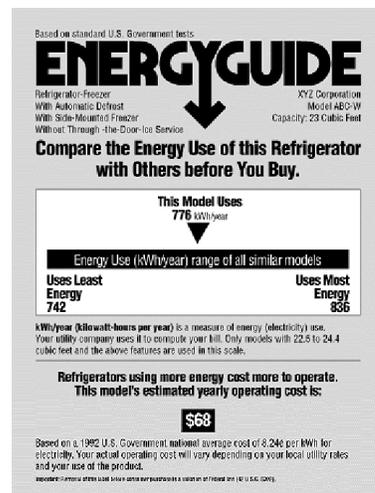
The potential for savings is even greater than these numbers reflect. They do not include the cost of water, or the energy use and cost to heat the water used by washers and dishwashers. In cooling dominated climates, energy-efficient appliances that do not excessively heat the indoor air can save additional energy by lowering air-conditioning use.

The true (lifecycle) cost of an appliance is the purchase price plus the cost to operate and maintain it over its lifetime. The reduced operating cost of a more energy-efficient appliance is often sufficient to quickly pay back its higher initial cost.

It is important to consider appliance placement when designing the home. For example, placing a refrigerator or freezer near a heat source such as an oven, dishwasher, heating vent, or direct sunlight will cause it to use more energy to keep food cool.

Because major appliances can remain in operation for 15 to 20 years, it is important to consider energy use and its impact on future users at the time of purchase. Home owners should consider replacing major home appliances that are 10 to 15 years old.

ENERGYGUIDE LABEL



LOOK FOR ENERGYGUIDE LABELS

Federal law requires a bright yellow EnergyGuide label to be placed on many types of home appliances, including refrigerators, freezers, dishwashers, and clothes washers. This label allows the consumer to estimate how much a particular appliance will cost to operate each year and to compare this cost among similar appliances. The comparison scale on the EnergyGuide shows the least and most energy used by comparable models. The labeled model is represented by an arrow pointing to its relative position on that scale. Choose a model that is more energy-efficient and has a lower operating cost than the least efficient model of the product class.

Although operating costs shown on the EnergyGuide are calculated using a national average energy cost, the local actual operating cost can be easily estimated by multiplying the local energy rate by the estimated energy use of the appliance as listed on the EnergyGuide.



ENERGY STAR®



The ENERGY STAR program is a joint effort by the U.S. Department of Energy and the U.S. Environmental Protection Agency that identifies high-efficiency appliances.

Manufacturers participating in the ENERGY STAR program can put an ENERGY STAR label on their models that exceed the federal minimum efficiency standards for appliances by a specific percentage (usually 15 to 20 percent, depending on the type of appliance) or a specified energy consumption level. ENERGY STAR appliances in the program include clothes washers, dishwashers, refrigerators, televisions, VCRs, home audio equipment, DVDs, computer monitors, and printers.

REFRIGERATORS AND FREEZERS

Refrigerators and freezers consume about one-sixth of all the electricity used in American households, much more than any other household appliance. The annual cost to operate existing units is about \$125, while new, efficient refrigerators cost about \$50 to \$100 per year to operate.

✓ PURCHASING CONSIDERATIONS

- Select an ENERGY STAR model.
- Select a refrigerator of the appropriate size for the household's needs. Larger models use more energy, as do refrigerators that are under-utilized or overly full.
- Choose top-freezer models instead of side-by-side refrigerators, which use approximately 10 to 25 percent more energy.
- Select only those features that the household needs. Automatic ice makers and through-the-door dispensers increase energy use by 14 to 20 percent and increase the purchase price by \$75 to \$250. Models with anti-sweat heaters consume 5 to 10 percent more energy; however, some refrigerators with this feature have "energy saver" switches that allow the owner to turn these heaters off.
- Chest freezers are usually more efficient than upright freezers. They are better insulated, and the cold air does not spill out when the door is opened. Automatic defrost freezers can consume 40 to 50 percent more electricity than manual defrost models.

✓ MAINTENANCE RECOMMENDATIONS

- Regular cleaning of the condenser coils every six to twelve months can improve the efficiency by as much as 30 percent. Use extra caution to avoid damaging the coils.
- Door seals should be airtight. To test them, close the door on a single sheet of paper and try to pull it out. If it slides out easily, the gasket needs to be replaced to prevent cold air from leaking out, or consider buying a new unit.
- Place the refrigerator or freezer away from a potential heat source.
- Keep the temperature inside the refrigerator between 37°F and 40°F. The freezer temperature should be set between 0°F and 5°F for long-term storage or between 10°F and 15°F if frozen foods are usually eaten quickly.
- Unplug refrigerators and freezers that are not being used to prevent unnecessary energy use.
- Energy efficiency of refrigerators that are 10 to 20 years old can be as much as 60 percent of that of a current model. Therefore, replace older refrigerators to reduce energy bills by as much as \$15 per month, a savings of \$180 per year.

OVENS AND RANGES

An ENERGY STAR rating is not currently given to ovens and ranges. However, there are items to consider in purchasing and operating a stove that can lead to lower energy bills.

✓ PURCHASING CONSIDERATIONS

- Select a gas oven and range if possible. The major drawback to gas is the potential health risks from the combustion by-products. A proper ventilation system will minimize this risk.
- Self-cleaning ovens are better insulated than other models, so they are more energy-efficient when used appropriately.
- Electric ranges containing ceramic, halogen, or induction range elements are more efficient than the type containing electric coils. They are also easier to clean and allow for greater temperature control.
- Consider range hoods with a low-sone rating to eliminate noise and provide proper ventilation. Select a model that exhausts fumes and moisture outside rather than recirculating the air within the home. If a range hood is not possible, consider a direct-vented stove if selecting a gas unit.

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✓ MAINTENANCE RECOMMENDATIONS

- The self-cleaning feature uses high amounts of energy and reduces the overall energy savings of the model. Operate this feature only when necessary, no more than once a month, and directly after using the oven to minimize energy consumption.
- Many gas ranges offer pilotless ignition systems with a sealed burner. It is important to keep the igniter clean to provide flawless ignition.

DISHWASHERS

Overall, dishwashers are a better and more efficient way to clean dishes than hand washing. Efficient models can use an average of 5.8 gallons of water per load compared with hand washing, which can use up to 6.8 gallons of water for the same load.

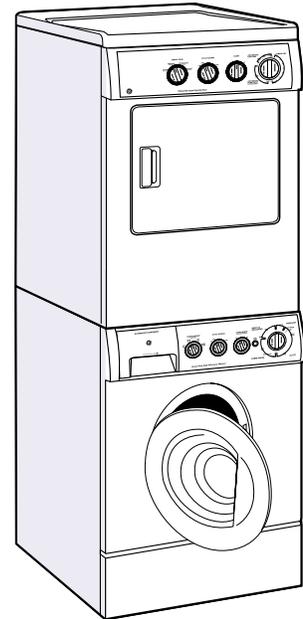
Heating water accounts for more than 80 percent of the energy used by dishwashers to clean dishes. Newer, more efficient models save water and energy and also tend to wash better.

✓ PURCHASING CONSIDERATIONS

- Select an ENERGY STAR model.
- Choose a model with a booster heater that has the ability to raise water temperatures to 140°F to 145°F; this will allow additional money to be saved by setting the water heater to 120°F.
- Look for a dishwasher that provides enough cycles to handle loads of varying food soil. This will minimize overuse of water and energy.
- Choose a model with metered fill as opposed to timed fill. A metered fill model uses a float to measure the water level inside the dishwasher and to fill the unit to the correct level regardless of the water pressure. Timed fill models are less precise because of water pressure variations.
- Select a dishwasher that has an air-dry or overnight-dry feature. Heat drying quickly dries the dishes but at the expense of increased energy use.

CLOTHES WASHERS AND DRYERS

Invest wisely in these and other large appliances since they often have a lifetime greater than 15 years. The energy and resource savings potential of an efficient model can provide an early payback and cost savings throughout its life.



CLOTHES WASHERS

A typical washer will cost about \$1,100 to operate over its lifetime. Ninety percent of the energy used in operating a washing machine goes toward heating the water that will wash and rinse the clothes. The motor uses only 10 percent of the total energy consumed. Most conventional washing machines use 25 to 40 gallons of water per complete cycle. Water-saving versions can cut water and energy usage by more than 40 percent.

✓ PURCHASING CONSIDERATIONS

- Select an ENERGY STAR model.
- The most energy-efficient washing machines are horizontal axis (typically front-loading) machines. They use about one-third the water of a conventional machine to wash the same amount of clothes. These models also do not have agitators, which means they are gentler on clothes. They also spin clothes faster, which results in less drying time and costs.

✓ MAINTENANCE RECOMMENDATIONS

- Use the cold water settings as much as possible. Modern detergents are designed for cold water washing. This reduces the energy used to heat water.
- Periodically check hose fittings and screen, water-intake lines, and drain lines for metal or sediment deposits.

ENERGY-EFFICIENT APPLIANCES

For more information, contact:

Energy Efficiency and Renewable Energy Clearinghouse (EREC)

1-800-DOE-3732
www.eren.doe.gov

Or visit the BTS Web site at
www.eren.doe.gov/buildings

Or visit the DOE Energy Efficiency and Renewable Energy Network (EREN) Web site at
www.eren.doe.gov

Or visit the EPA ENERGY STAR Web site at
www.energystar.gov

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CLOTHES DRYERS

An ENERGY STAR rating is not currently given to clothes dryers. However, there are items to consider in purchasing and operating a clothes dryer.

✓ PURCHASING CONSIDERATIONS

- Select a gas dryer if possible. Gas dryers cost on average 15 to 20 cents per load to operate, while electric dryers cost on average 30 to 40 cents per load.
- Look for a dryer with a moisture sensor in the drum instead of a temperature sensor near the exhaust. This type of dryer is more accurate in sensing the drying time needed for clothes and will prevent over-drying.

✓ MAINTENANCE RECOMMENDATIONS

- Clean the lint filter after every load to reduce the possibility of fire. This also increases air flow and decreases drying time.
- Dry a full load of clothes. The dryer uses nearly the same amount of energy to dry a few items as it does to dry a full load.
- Dry two or more loads consecutively to save energy by taking advantage of excess heat left in the dryer from the previous load.
- Consider using air or sun drying. These are free and use only renewable energy resources.

PHANTOM LOADS

When an appliance is turned off, you may think it is saving energy, but many appliances continue to draw power even after they have been turned off. This is called a phantom load. The United States uses about 43 billion kWh of electricity per year as a result of this continuous, low-level energy use. The average home uses about 450 kWh per year of its total

energy consumption to power phantom loads, or about \$28 per year. Features such as remote controls, clocks, timers, memories, microprocessors, and instant-on features are indicators that an appliance will continue to use power even when it has been turned off.

Televisions and VCRs are big contributors to phantom loads. Electricity use in televisions that are turned "off" costs the United States more than \$750 million each year. The electricity is used to maintain the remote control and instant-on features, and to keep the filaments in the picture tube warm 24 hours a day.

✓ WORKING AROUND PHANTOM LOADS

- If possible, choose an appliance without a built-in clock or timer. While the displays only consume about ½ Watt, the power supply in the appliance is converting 120 volts of alternating current to low-voltage direct current for the clock or timer. This is very inefficient and consumes 100 to 200 Wh per day. This is enough energy to run a compact fluorescent light bulb continuously for 10 hours.
- Avoid leaving appliances with small transformers plugged in while not in use. Also, consider purchasing all-in-one appliances, such as a phone with built-in answering machine and caller id display. This will reduce the number of small transformers plugged in. Small transformers are power supplies in plastic boxes that plug into a standard wall outlet.
- Unplugging the appliance when it is not in use is one way of avoiding phantom loads, or use a power strip and switch it off when the appliance is not in use.



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