

# Easy on Energy: Tips for Conserving

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## U.S. Homes are Large Users of Energy

- The U.S. has about 5% of the world's population, but uses about 26% of the world's energy. In 2004, home energy consumption, including electricity, accounted for about 21% of the total U.S. energy consumption. Sources: *www.climatevision.gov* July 11, 2005, and U.S. Department of Energy (DOE)
- Energy consumption from fossil fuel combustion is a main contributor to greenhouse gas emissions in the U.S. and the world. Home energy use accounts for about 20% of the energy-related U.S. carbon dioxide (CO<sub>2</sub>) emissions, a major contributor to global warming. Since 1990, 33% of the total increase in U.S. energy related CO<sub>2</sub> emissions was from residential sources.
- Reducing emissions of CO<sub>2</sub> is a key strategy for slowing global warming. Home energy usage and CO<sub>2</sub> emissions are strongly influenced by living space features, behavior, building structures and appliance efficiency choices. Building design, construction, and maintenance have huge impacts on our environment.

Improving the energy-efficiency of our homes can save money, conserve resources and fossil fuels such as oil and coal, and help reduce greenhouse gas emissions. New products are available and products are more efficient than ever. These ten tips can start you on the way to lowering energy usage and reducing costs and emissions over time.

### 1. Dial Down:

Turn the thermostat down in the winter and up in summer. You save about 2% to 3% on your heating bill for every 1° that you lower the thermostat setting. For example, if the thermostat is set at 73°F in the winter, and you lower it by 3° to 70°F, you will save about 9% or 9 cents for every dollar you spend on heating costs.

A programmable thermostat, costing \$30 to \$200, schedules temperature adjustments. It can automatically cut back on heating at night after bedtime, turn the heat up again before people arise, and adjust for weekends. If used properly, ENERGY STAR labeled thermostats can save up to \$100 a year. Source: *www.sustainable.doe.gov/buildings/gbintro.shtml*

### 2. Select Energy Efficiency Products:



Source: *www.energystar.gov*

Products have two price tags — the cost to purchase and the cost to use or operate. Compare energy efficiencies.

The ENERGY STAR label means that the product meets the increased energy efficiency guidelines set by the U.S. Environmental Protection Agency (EPA) and the Department of Energy (DOE) for that product line. More than 40 product categories are evaluated for the ENERGY STAR label including heating and cooling equipment, insulating and air sealing items, and windows, doors and roof products. Many home electronics products, appliances and lighting and light fixtures are tested for compliance with the ENERGY STAR efficiency guidelines.

Depending on the cost of electricity and how the products are used, you can save energy and dollars using ENERGY STAR products. For example, when comparing annual utility costs for ENERGY STAR appliances, an ENERGY STAR qualified . . .

- refrigerator can save more than \$35/year
- dishwasher can save about \$20/year
- clothes washers can save about \$60/year.
- room air conditioner to replace a 10 year old model can save about \$15/year
- 40 pint dehumidifier can save \$20/year

The total saved for all of these examples over ten years is about \$1,500. Some appliances also conserve water.

In addition to ENERGY STAR, look for the yellow EnergyGuide label on some appliances. The EnergyGuide indicates the approximate annual operating costs and efficiency for each model and a scale to compare models.



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### 3. Seal Air Duct Seams:

Typical homes leak about 15 percent to 20% of the heated or cooled air into unheated and non-cooled spaces such as attics, crawlspaces, walls, basements, and garages. Duct leaks can add hundreds of dollars a year to utility bills.

Seal air duct seams or holes to get the conditioned air to the places you want it. Sealing and insulating duct systems can improve a heating and cooling system's efficiency by as much as 20 percent and result in savings of up to \$150 annually (DOE). Ask a professional heating and cooling contractor who is trained to inspect and test for duct leakage, to evaluate ductwork.

Duct seams that are exposed are easy to seal. Use mastic, or Underwriters Laboratories (UL) 181 approved foil-based duct tape (not regular duct tape) to seal joints or seams as well as cover gaps or holes. Mastic is a paste found at some wholesale and retail heating and cooling businesses, and can be brushed onto the seams. *Ducts in more difficult spaces should be sealed and insulated by qualified professionals using appropriate sealing materials*

If you insulate ducts in unconditioned areas that have water pipes, use pipe insulation, wraps, or electric heating tape wrap to prevent freezing pipes and drains. For more information, go to [www.energystar.gov/ducts](http://www.energystar.gov/ducts).

### 4. Select Energy Efficient Windows:

Windows in cold climates (Nebraska) can account for about 25% of an average home's heating load. In cold weather, close curtains and shades at night. In hot weather and especially on the east and west sides of homes, close curtains and shades during the day and when away. Install awnings or plant trees to block the summer sun and windbreaks to block winter winds.

Replace single pane windows with double-pane windows with high performance glass or add high performance storm windows. Installing storm windows can reduce heat loss by as much as 50 percent. High-performance (more energy efficient) windows with insulated frames create warmer interior glass surfaces, reducing frost and condensation on interior surfaces.

Look for the ENERGY STAR label. ENERGY STAR windows must be NFRC rated by the National Fenestration Rating Council. The NFRC label is found on windows made by participating manufacturers. The label can be used to compare energy ratings including the U-value or factor, solar heat gain coefficient (SHGC), visible light transmittance, and air leakage.

Lower U-values or insulating values for windows mean they insulate better. Select a whole window U-value of 0.35 or lower. The SHGC tells how well the product blocks heat caused by sunlight and ranges from 0 to 1 (highest). Generally, a SHGC between 0.30 and 0.60 is suggested for our region. Look for an air-leakage rating of 0.30 cubic ft/minute or less.

### Energy Efficient Window Example

Glass Comparisons	U-value	Solar transmittance	Visible light transmittance
Single glass	1.1	84%	90%
Low-e insulated	.40 - .29	58%	76%
Low-e insulated with Argon gas	.34 - .23	58%	76%

Correct installation is essential for any window style. Poor installation may lead to poor performance including air leaks and water moving into the inner wall cavity causing damaged wood and siding. If in doubt about the installation methods, contact the manufacturer. For more tips on windows, go to [www.eren.doe.gov/consumerinfo/energy\\_savers/windows.html](http://www.eren.doe.gov/consumerinfo/energy_savers/windows.html) or to [www.efficientwindows.org/factsheets/Nebraska.pdf](http://www.efficientwindows.org/factsheets/Nebraska.pdf)

### 5. Caulk and Weatherstrip:

About 1/3 of the air that moves through homes comes in or exits through holes and cracks in ceilings, walls, floors and foundations. Tightening up houses is important, however if your home already is tight and you have combustion appliances and equipment, make sure you have enough incoming air for combustion. Install carbon monoxide alarms in your home.

Caulk and weatherstrip doors and windows. Replace cracked windowpanes and repair glazing. Caulk where the materials meet around the door and window frames — but do not caulk the window shut. Caulk around any exterior penetration such as utility entrances, pipes and vents. Caulk foundation cracks. Inside, caulk cracks in the ceiling, and between rooms that may leak air into the attic or garage. In the basement, caulk at the sill plate and exterior foundation.

Use the correct caulk for the materials. Caulks are made for use with metals, masonry, wood, plastics and combinations of materials - read the labels and select for the materials, use and quality. If the hole or crack is wider than about 1/4", use rope caulk or a suitable material first and then caulk. If you use a foam, read the label carefully — know where it is to be used, how it reacts to temperatures and moisture, whether it expands, the color and the materials for which it is suited.

Weatherstripping comes in various forms for specific purposes such as door bottoms and sides, sections of windows, and around attic hatches. Select a durable product and inspect it yearly. You may pay a little more for quality, but you will not replace it as often.

### 6. Increase Heating Efficiency:

Maintaining the system and sealing air ducts will increase efficiency and is critical. Have systems serviced annually and maintain clean filter systems as specified. To operate efficiently, heating and cooling units must be sized correctly for the space. An over-sized system wastes energy, costs more up front and to operate over its lifetime, and will not dehumidify or provide comfort like it should.

Look for the ENERGY STAR logo and Energy Guide labels to compare efficiencies. Also, look for terms like the Annual Fuel Utilization Efficiency (AFUE) rating, the Heating Seasonal Performance Factor (HSPF), or the Coefficient of Performance (COP) to compare products. Look for higher ratings in general.

*Furnaces and boilers:* The minimum rating is a 78 percent AFUE. ENERGY STAR qualified furnace models have AFUE ratings of 90 percent and up to 96 percent making them 15 percent more efficient than standard models. ENERGY STAR qualified boilers must have an AFUE of 85 percent and up. Look for the higher AFUE ratings.

*Heat pumps:* Heat pumps are used for both heating and cooling. Heat pumps may reduce the energy used for heating by up to 50 percent, and 30 percent to 40 percent in homes with regular resistance electric heating systems. Geothermal heat pumps are more efficient than air-source heat pumps. Geothermal heat pumps use the “heat” from the ground (ground-source or closed-loop) or from water (open-loop water systems or groundwater heat pumps).

The COP rating indicates the heating efficiency of ground-source and water-source heat pumps. The minimum COP available is 2.8. Look for ENERGY STAR ratings of COP of 3.3 and up to 4.9 for ground-source closed-loop or 3.6 and up to 5.6 for water-source open-loop heat pumps.

For air-source heat pumps, look for the ENERGY STAR label of 8.2 HSPF or above. The minimum HSPF is 7.7 with the most efficient between 8.2 and 10. Air-source heat pumps use a backup system to work with the heat pump when temperatures drop very low. Source: [www.energystar.gov](http://www.energystar.gov).

## 7. Increase Cooling Efficiency:

The Energy Efficiency Ratio (EER) and the Seasonal Energy Efficiency Ratio (SEER) indicate the cooling efficiency ratings. Higher ratings are more efficient.

*Central air conditioning system:* Look for the ENERGY STAR label, awarded to those units with a SEER of 14 or higher (up to 18) or an EER of 11 or higher making them about 8 percent more efficient (U.S. DOE EERE).

*Heat pumps:* The ENERGYSTAR minimum EER rating is 14.1 and goes up to 25.8 for a ground-source closed-loop heat pump. For a water-source open loop heat pump, the ENERGYSTAR minimum EER is 16.2 and up to 31.1. For air-source heat pumps, select a unit with a 14 and up to 18 SEER or 11.5 and up EER rating.

*Room sized or window air-conditioning units:* Look for the ENERGY STAR label, which indicates an EER of 9.4 to 10.8 and higher depending on the capacity and style. This means a model is at least 10 percent more efficient than the standard. Place window air conditioners in windows on the north side or in shaded areas. Insulate or store window air conditioners in the winter.

Trees provide evaporative cooling in the area where they are located (a difference of 3-5 degrees F) and much-needed shade in the summer.

## 8. Check Insulation:

Insulation may be inadequate in your home. R-value is a measure of resistance to heat flowing through an insulation material. In Nebraska, the recommended value for attics is R-49; walls, R-18; floors, R-25; and slab edge, R-8. Recommended R-values for homes with electrical resistance heat are higher.

## 9. Switch Out Light bulbs:

Lighting accounts for 5 percent to 10 percent of the total home energy use. ENERGY STAR qualified compact fluorescent light bulbs provide bright, warm light while using 2/3 less energy than standard lighting, generate 70 percent less heat, and lasts up to 10 times longer than traditional incandescent light bulbs. Replacing one traditional incandescent bulb with a screw-in ENERGY STAR compact fluorescent will save about \$25 per bulb in energy costs over its lifetime. Although the bulbs may cost more up front, they save over the long run.

If every U.S. home owner changed out just five high-use light fixtures/bulbs with ENERGY STAR fixtures/ bulbs, he or she would save more than \$60 every year in energy costs, and together we would generate about one trillion fewer pounds of greenhouse gases. That is a \$6 billion energy savings for U.S. householders, equivalent to the annual output of more than 21 power plants (EPA and DOE).

Make the most of natural daylight, use task rather than general lighting, and turn off unnecessary lights. If bi-level switching or dimmers are available, use the lowest setting that meets your need.

A newer very efficient light source is LED (light emitting diode) seen in traffic lights, brake lights and flashlights. LED and organic light emitting diode technologies are creating advances in solid-state lighting (SSL), and may mean SSL will compete as a significant low energy use light source for the home. Solar powered exterior and porch lighting are also available.

### Cost per year to operate for same amount of lumens or light

<i>Incandescent Bulb</i>	<i>Fluorescent Bulb</i>
1 bulb costs about \$4.80/yr	1 bulb costs about \$1.20/yr.
10 bulbs cost \$48.00/yr.	10 bulbs cost \$12.00/yr

## 10. When “Off” is “On”

When computers, printers, TVs or other appliances are not being used, turn them completely off or use a power strip to disconnect the item. About 40 percent of the electricity used to power home electronics is used while the products are turned “off” but are “ready on” or powering other features. Electronics in the sleep mode can use up to 20 percent of electricity needed when they are fully on.

Electronics that have the ENERGY STAR label use as much as 50 percent less energy to perform these functions.

Select ENERGY STAR appliances and electronics with power management capabilities to eliminate energy waste. For example, printers with automatic “power down” features can reduce their electricity use by more than 65 percent. ENERGY STAR qualified office products use about half as much electricity as standard equipment.

## Conclusion

Managing the heat loss and gain in homes through caulking, weatherstripping, insulating, sealing air ducts and selecting high performance windows can save energy and dollars. Selecting ENERGY STAR qualified appliances, heating and cooling equipment, lighting, and electronics adds to the savings. Turning off “ready-on” products when not in use saves energy and lowers energy costs.

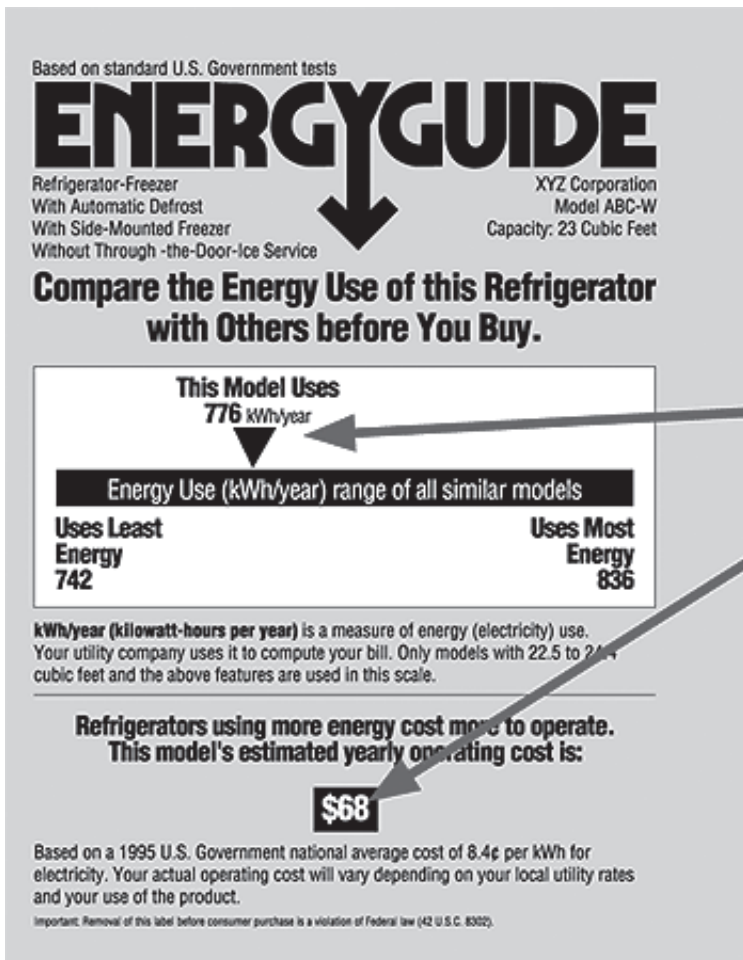
## Resources

Climate Vision, 2005, July 11, [www.climatevision.gov](http://www.climatevision.gov) U.S. Department of Energy  
*Energy Savers: Tips on Saving Energy & Money at Home:*  
[www1.eere.energy.gov/consumer/tips/pdfs/energy\\_savers.pdf](http://www1.eere.energy.gov/consumer/tips/pdfs/energy_savers.pdf)

Geothermal Heat Pumps—Department of Energy:  
[http://www.eren.doe.gov/RE/geo\\_heat\\_pumps.html](http://www.eren.doe.gov/RE/geo_heat_pumps.html)  
 Consumer Information (800) 342-5468:  
[www.eere.energy.gov/consumer](http://www.eere.energy.gov/consumer)  
 Air-Source Heat Pumps: [www.eere.energy.gov/consumer/your\\_home/space\\_heating\\_cooling/index.cfm/mytopic=01262](http://www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=01262)  
 Energy Star®: (888) 782-7937 [www.energystar.gov](http://www.energystar.gov)  
 Energy Efficiency and Renewable Energy Clearinghouse:  
 1-800-363-3732 Fax: 1-703-893-0400  
[www1.eere.energy.gov/consumer/tips/pdfs/energy\\_savers.pdf](http://www1.eere.energy.gov/consumer/tips/pdfs/energy_savers.pdf)  
 Energy Fact Sheets:  
[www.eere.energy.gov/office\\_eere/factsheets.html](http://www.eere.energy.gov/office_eere/factsheets.html)  
 U.S. Environmental Protection Agency ENERGY STAR Programs: [www.energystar.gov](http://www.energystar.gov)

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### EnergyGuide Label

1. Estimated energy consumption showing range and comparison to similar models.
2. Estimated yearly operating cost based on the national average cost of electricity.