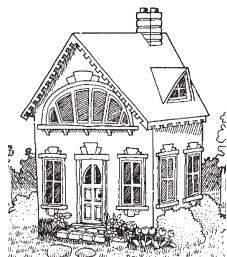


Home Energy Brief



#3 REFRIGERATORS & FREEZERS

Refrigerators and freezers consume about a sixth of all electricity used in American homes, and much of that can be saved. Although advances in technology have cut refrigerator energy consumption by 60% over the past twenty years, the refrigerator still uses far more electricity than any other home appliance. In just the past two years, Federal appliance standards have improved refrigerator efficiency by 20% to 25%. Even these dramatic gains can be bettered: studies and field tests have shown that manufacturers can make refrigerators that use less than one-third as much electricity as a new model meeting the 1993 appliance standards.

If you have an old model, it is probably very inefficient and could cost up to \$140 a year in electricity to run (or twice that if you have high electric rates). A new, efficient one could save up to two-thirds of that electricity cost, and it may be cost-effective to replace an old clunker even before it dies a natural death.

Since all of the electricity used by your refrigerator is converted into waste heat vented out the back of the fridge, saving 1,000 kWh per year by buying a new fridge will also save you approximately \$34 in air conditioning costs every year. This will reduce your payback from eight or nine years to six years.

Choosing a New Refrigerator

If you're in the market for a new refrigerator, it definitely pays to shop around for an efficient one, since there is significant variation in the energy efficiency of various models.

Carefully consider the style, size, and features you want and what the energy implications might be. The good news is that efficient models often cost less than inefficient ones, since many of the features which add to cost – such as through-the-door ice – also add to

energy consumption, while those that save energy, like better insulation, also make other components smaller (compressors) or unnecessary (anti-sweat heaters).

Many electric utilities offer incentives, typically a rebate of around \$100, to customers in the market for a new refrigerator. Call your utility and ask if they offer rebates.

- Side-by-side refrigerator/freezers use roughly 7-13% more energy than similarly sized top-freezer models.
- Larger units usually consume more electricity than smaller ones but may be more efficient on the basis of kilowatt-hours per cubic foot. Too large a model wastes space and energy, but one too small might mean extra trips to the grocery store.
- It is much less expensive to buy and run one big refrigerator than two small ones, assuming roughly equal efficiencies.
- Automatic defrost on older fridges is an energy consumer but some new fridges use “smart” controls and a smaller heater that only operates when frost accumulates. The result is that some auto defrost models that are almost as efficient as manual defrost models.
- Anti-sweat heaters boost consumption by 5 to 10 percent.
- For the convenience of through-the-door water or ice dispensers you'll pay an extra \$250 in the purchase price, have higher electric bills, and you may even pay more in repair bills.
- Automatic ice-makers typically increase energy use by 14 to 20% and increase the price of a refrigerator by about \$75.
- The costliest refrigerator is the one you don't really need but run anyway – the one keeping a six-pack cold in the extra fridge in the garage. Unplug it.

ENERGY EXPENDITURES FOR THE MOST EFFICIENT NEW REFRIGERATORS (1993)

	Volume (cubic feet)	Energy Use (kWh/y)	Energy Cost (\$/y)
Top freezer	14.4	496	41
Top freezer	18.2	591	49
Top freezer	21.6	650	54
Top freezer*	22.3	726	60
Side-by-side*	21.7	759	63
Side-by-side*	23.6	799	66
Side-by-side*	26.6	898	74
1994 SERP Side-by-side*	22.0	760	62

All of the above have automatic defrost. *Denotes through-the-door ice. Adapted from Alex Wilson and John Morrill, *Consumer Guide to Home Energy Savings*. Based on 8.2 cents per kWh.

Check the "Energy Guide" labels that appear on all new models and compare annual energy usage to the values listed in the above chart. This chart shows the amount of electricity used (in kWh) and the energy cost in dollars per year at an electric rate of 8.2 cents per kilowatt-hour (electric rates vary), of the most efficient refrigerator/freezers commercially available in the U.S. in 1993 in the sizes and styles indicated. A comprehensive brand-name list of the most efficient refrigerator models in all sizes and styles can be found in *Consumer Guide to Home Energy Savings*, by Alex Wilson and John Morrill, available in bookstores or from the American Council for an Energy-Efficient Economy, 2140 Shattuck Avenue #202, Berkeley, CA 94704; (510) 549-9914.

Sun Frost Refrigerators

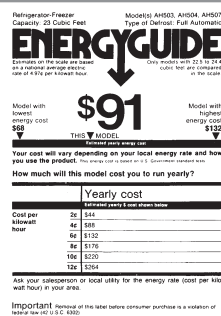
Sun Frost refrigerators have long been considered the most efficient models on the market. In recent years, Federal appliance standards and emerging technologies have narrowed the Sun Frosts' efficiency edge over conventional models. A *Consumer Reports* test of a 19 ft³ model indicated savings of 14 to 40% compared to mass-produced refrigerators. Sun Frost's higher efficiency is achieved with thicker insulation and two efficient top-mounted compressors. The thick (CFC-containing) insulated walls and door take up more space in your kitchen than standard refrigerators and, because the company custom makes each fridge, their price tag is high (\$2,000 and up for standard models). One bonus of the Sun Frost is that they maintain a high humidity so that vegeta-

bles will stay fresh longer.

Sun Frosts are most popular for homes with independent electric systems because they can be built to run on 12 or 24 volt systems and the high cost of photovoltaic (solar) panels justifies the investment in this electricity-saving refrigerator. Sun Frost refrigerators are manufactured with manual defrost in sizes ranging from 4 to 19 cubic feet. Contact the manufacturer for further details (Sun Frost, PO Box 1101, Arcata, CA 95591; (707) 822-9095; these models are not available from appliance dealers).

SERP Refrigerators

In a highly publicized contest recently sponsored by 25 U.S. utility companies, major manufacturers of refrigerators competed for a \$30 million purse in the Super Efficient Refrigerator Program (SERP). The goal was to produce an energy-efficient fridge, free of chlorofluorocarbons (CFCs). CFC chemicals contribute to the destruction of the earth's ozone layer and all manufacturers will be banned from using this substance by the end of 1995. Whirlpool won the competition and is now marketing a 22 cubic foot SERP™ fridge for KitchenAid, Sears, and Gibson as well as under their own brand name. The SERP fridge will retail in the \$1,200-\$1,600 range while exceeding the 1993 Federal refrigerator standards for



Energy Guide Labels, required on all refrigerators and freezers, provide useful information about annual energy costs and relative efficiency.

side-by-side refrigerators by almost 30% (side-by-side standards are not as stringent as those for refrigerators with the freezer on top).

There are many other energy-efficient refrigerators on the market, and the most energy-efficient brands with the freezer on top are still more efficient than Whirlpool's 1994 SERP™ side-by-side. Whirlpool has also begun selling other models and sizes of CFC-free refrigerators, and the race for efficiency continues. Manufacturers' innovations, such as vacuum insulating panels, dual evaporators, and new compressors will contribute another 10-30% in energy savings as early as 1995.

For more information on where to buy a SERP™ fridge call Whirlpool at (800) 253-1301 or the SERP organizers at (800) 927-3985. (The SERP refrigerator will only be available within the service territories of the utilities participating in the SERP program.) Contact your local utility for other opportunities for rebates on the purchase of new energy-efficient refrigerators.

Choosing a New Freezer

Consider buying a manual defrost freezer (which are more common anyway). Manual defrost freezers consume 35–40% less electricity than comparable automatic-defrost models. They'll cost you less to run, and do a better job of storing food, since auto-defrosters remove moisture and can dehydrate food, causing freezer burn. Because freezers are opened far less frequently than refrigerators, frost won't build up as quickly as it would in manual defrost refrigerators.

- Chest (top-loading) freezers are 9–22% more efficient than upright (front-loading) models because they are better insulated and less warm air enters the freezer compartment when the door is opened.
- Study Energy Guide labels carefully. The most efficient freezers currently available use the kWh per year indicated below and cost the amount per year shown at an electric rate of 8.2 cents per kWh.

Disposing of Your old Refrigerator or Freezer

Since refrigerators contain chlorofluorocarbons (CFCs), in their refrigerant (Freon) and foam insulation, it is important to dispose of retired units in an environmentally responsible manner. Further, the other materials (metals, plastics, etc.) can be recycled

ENERGY EXPEDITURES FOR THE MOST EFFICIENT NEW FREEZERS (1993)

	Volume (cubic)	Energy Use (kWh/y)	Energy Cost (\$/y)
Upright	14.0	492	41
Upright	17.0	528	44
Upright	21.7	569	47
Chest	14.8	425	35
Chest	17.8	475	39
Chest	22.7	545	45

All of the above units are manual defrost. Adapted from Alex Wilson and John Morrill, Consumer Guide to Home Energy Savings. Energy cost based on 8.2 cents per kWh.

to conserve resources. Contact your local utility to find out what programs exist in your area to recycle refrigerators. Unfortunately, such programs are not available in all localities, and many existing programs are not comprehensive.

For example, while about a dozen refrigerator recycling programs nationwide retrieve Freon, only one existing program (run by Northeast Utilities in Hartford, CT) also recovers CFCs from insulating foams. Since nearly 85% (approximately 2.5 lb. of the 3 lb. total) of the CFCs in a typical U.S. refrigerator is contained in the insulating foam, it is imperative that we work quickly to develop recycling programs that address this hazard. Citizens can urge their utilities and local governments to get involved in developing such programs in their area.

Greater Efficiency Through Maintenance

While it is important to not dawdle with the refrigerator door open, there are quite a few ways to help make any refrigerator operate more efficiently.

- **Check location:** You can boost energy efficiency by making sure your refrigerator is not located in direct sunlight or next to the oven or dishwasher. Also, be sure that air can circulate freely around condenser coils by leaving a space between the refrigerator and the wall or cabinets.
- **Keep the fridge top uncluttered:** Don't use the top of your refrigerator as an extra kitchen shelf. A cluttered fridge top can block the air-circulation needed to keep the compressor working efficiently.
- **Check temperature:** The refrigerator should measure between 36° and 40°F and the freezer between 0° and 5°F. Use a thermometer to check the actual temperature, and adjust the thermostat

if necessary. Your refrigerator can use 25% more energy if it is kept 10°F colder than recommended levels.

- **Clean condenser coils:** At least once a year, unplug the unit and brush or vacuum off the condenser coils (located on the back of the refrigerator or behind the front grill). Dust and dirt accumulation degrades performance.
- **Check door seals:** Keep door seals or gaskets clean and in good repair. If the seals can't hold a dollar bill firmly in place, they may be ripe for replacement. Your appliance dealer can get them for you. (This test may not work if your fridge has magnetic seals; in this case, put a bright flashlight inside the refrigerator, dim the lights in the kitchen, and check for light leakage.) New seals are not cheap, however, and this may be a good time to decide whether to buy a new efficient refrigerator.
- **Check "Power-Saver" switch:** Many refrigerators have small heaters (yes, heaters!) in the walls to prevent condensation build-up on the outside surfaces. If you have the option to switch this feature off, do it!
- **Defrost as needed:** If you have a manual defrost or partial automatic defrost, be sure to defrost the unit regularly. Buildup of ice on the coils makes the compressor run longer, wasting energy.
- **Cover liquids and foods.**
- **Mark packages and containers for easy identification:** Scratching your head with the refrigerator door open wastes energy.
- **Keep cold air in:** Remember to open the door as infrequently and as briefly as possible. Less cold air will spill out when you do open the door if the refrigerator or freezer is nearly full. If your freezer is almost empty, put in a few air- or water-filled plastic containers. "CHILLshield" is a system of vinyl flaps that prevents cold air from escaping when the refrigerator door is opened, saving up to 10-20% of the appliance's energy use. It is available for \$25 from The Conserve Group (PO Box 1560, Bethlehem, PA 18016-1560; 215/691-8024) and from environmental stores and catalogs.
- **Install an energy-saving Green Plug:** This device reduces the voltage of the electricity feeding into an appliance, which reduces energy waste. At a cost of \$35-\$40, a Green Plug will save 3% to 20% of your refrigerator's electricity consumption, paying for itself in 1 1/2 to 10 years. Green Plugs require some adjustment to your fridge evaporator fan louver (the dial setting in the freezer) and are most cost-effective in regions with high electricity rates and higher line voltage. They are available through hardware and department stores and home centers. For more information contact Green Technologies Inc., 5490 Spine Road, Boulder, CO 80301; (800/600-1100).

For more on window technologies, insulating solutions, and related home-energy measures, see Rocky Mountain Institute's forthcoming *Homemade Money: How to Save Energy and Dollars in Your Home*. Other titles in this series of Home Energy Briefs include *Lighting*; *Windows*; *Water Heating*; *Cooking Appliances and Dishwashers*; *Washers, Dryers, and Miscellaneous Appliances*; and *Computers and Peripherals*. Written by Sue Hassol. © Rocky Mountain Institute 1994.

Rocky Mountain Institute is a nonprofit research and educational organization whose goal is to foster the efficient and sustainable use of resources as a path to global security. This publication is intended to help you improve the resource efficiency of your home. You should use your best judgement about your home, and seek expert advice when appropriate. Rocky Mountain Institute does not endorse any products mentioned and does not assume any responsibility for the accuracy or completeness of the information in this Brief. These Briefs are funded by the educational Foundation of America and the W. Alton Jones Foundation. Printed on recycled paper with soy-based inks.

To request additional copies please contact Rocky Mountain Institute, 1739 Snowmass Creek Road, Snowmass CO 81654-9199 Telephone: (970) 927-3851 Fax: (970) 927-3420