

Save hundreds on

ENERGY COSTS

10
THINGS YOU
CAN DO NOW

You want to save money as well as do your part to combat global warming. But what's the best way to get started? This special section includes the results from our testing and advice from our experts on the products and programs that work and those that promise more than they deliver.

1 CHANGE YOUR LIGHTS Energy Star-qualified compact fluorescent lightbulbs (CFLs) are required to meet certain standards, one of which is they have to save you at least \$30 in energy

costs over the bulb's roughly 7,500- to 10,000-hour life. While concerns about mercury content have raised questions about those more-efficient bulbs, they contain only a fraction of the mercury in an old-fashioned thermometer.

But the mercury inside CFLs means you should take them to a recycling center instead of throwing them in the trash. For buying advice on the types of CFLs and tips on the best places to use them, see "New Twists in Savings," on page 28.

2 PROGRAM YOUR THERMOSTAT

Lowering your home's temperature 5 to 10 degrees at night and when no one is home can slash your heating costs by up to 20 percent per year. Programmable thermostats are supposed to make saving simpler. But confusing controls on some models might actually discourage savings. According to the U.S. Environmental Protection Agency, roughly 50 percent of homeowners don't change temperature settings at night. Check our report on page 30 for electronic setback thermostats that work best and have the friendliest controls and displays.

3 BOOST HEATING EFFICIENCY

A new furnace or boiler probably won't save you enough to recoup the \$4,000 to \$5,000 you'll spend to replace it. Instead, make your current system more efficient by sealing any cracks or gaps in ductwork and by insulating the ducts. Also caulk any holes in your walls, especially if they penetrate between floors to an unheated basement or attic. Those holes turn walls into pathways

competitive: 10 cents vs. 13 cents for an equivalent-size gasoline-powered car. Honda claims its new FCX, for example, gets the equivalent of about 61 mpg.

Range and storage issues. Hydrogen is the lightest element, and so it carries very little energy. At a pressure of about 5,000 psi, even with a large hydrogen tank, a typical FCV has a driving range of less than 300 miles. GM and other automakers are working to extend the range by using tanks that hold hydrogen at 10,000 psi.

Few hydrogen stations. Today there are only 44 hydrogen stations in the U.S., according to the National Hydrogen Association, an industry trade group. And only a few are open to the public.

To kick-start the hydrogen infrastructure, California, Illinois, New York, and Texas, plus British Columbia, have launched initiatives to build "hydrogen highways" that would support FCVs. They will initially be centered in major metro areas and will extend out from there.

Joan Ogden, director of the Sustainable Transportation Energy Pathways project at UC Davis, estimates it will cost \$12 billion to \$20 billion between 2012 and 2025 to build enough stations along major interstate highways to allow FCVs to travel across the country.

Energy companies are optimistic that once universal codes and standards are adopted, stations can be built quickly. "Our intention is that we'd have a sufficient number of stations to support a rollout of fuel-cell cars between now and 2020," says David Austgen, a general manager at Shell Hydrogen.

Vehicle costs. Experts say the price of FCVs would have to be comparable with that of conventional cars before consumers would buy them. Bill Reinert, national manager of Toyota's Advanced Technologies Group, expects that im-

provements in materials and production will bring costs in line.

An example of that is Honda's second-generation FCX, which will cost less than half to produce than the first one did, says Chris Naughton, a Honda representative. Still, the first FCVs may sell at luxury prices.

Safety concerns. Some people worry about driving a car with a tank of pressurized, flammable hydrogen gas. But experts claim that with proper care, hydrogen could be at least as safe as gasoline. In testing, the storage tanks are subjected to drop tests, vibration, fires, and bullets, and so far there have been no red flags, says Sunita Satyapal, a team leader for hydrogen storage at the Department of Energy.

Hydrogen "diffuses to the point that it's hard to have a safety issue," says Keith Wipke, a senior engineer at the National Renewable Energy Laboratory. For example, hydrogen won't pool underneath a car after an accident, as does gasoline.

Still, leaks can occur. And if hydrogen gas accumulates in a closed space, it could be ignited. Some experts have proposed that hydrogen detectors be developed to warn people of leaks.

THE ROAD AHEAD

In 2015 the Department of Energy expects to make a decision with automakers and energy companies about whether FCVs can be made commercially viable. If things look good, the first FCVs offered for sale could be introduced soon after.

Some automakers have already announced plans to commercialize FCVs before 2020. GM has even said it expects to have FCVs in showrooms by 2012. But some experts say it will take a critical mass of 500,000 FCVs to bring costs in line. That could take until 2025 or 2030.

For flexibility, FCVs will be able to be powered by either a hydrogen fuel cell or a

battery pack that, in some, can be charged by plugging into electrical outlets, says Scott Samuelsen, professor of mechanical, aerospace, and environmental engineering at the University of California, Irvine.

The next few years will determine whether FCVs are headed for the open highway or a dead end. In the meantime, weaning America off fossil fuels will take more than FCVs. Consumers Union, the nonprofit publisher of CONSUMER REPORTS, thinks the U.S. needs to pursue higher fuel-economy standards for gasoline vehicles, as well as alternative vehicles powered by clean diesel, biofuels, and batteries. It will take a variety of efforts to lead the country out of the petroleum era and into the next energy age.

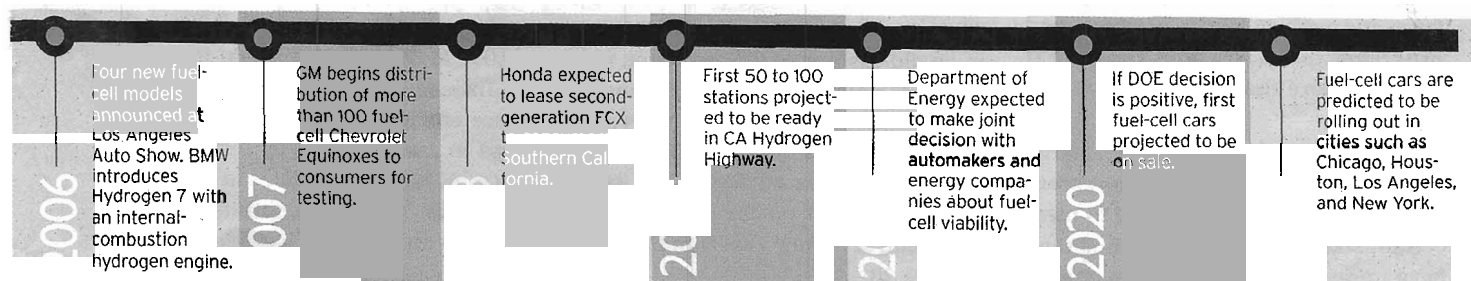
Want to drive an FCV?

GM's Project Driveway allows people in the New York and Washington, D.C., areas and California to drive one of its 100 fuel-cell-powered Chevy Equinox SUVs for up to several months. To apply, go to www.chevrolet.com/fuelcell and click on "Apply for test program."

Next year, Honda plans to lease its second-generation FCX sedans to at least 20 people in Southern California. For information: automobiles.honda.com/future-cars/fcx-concept.aspx.



O'rianika Kilcher is one of two people leasing Honda's first-generation FCX.



CR Quick Recommendations

All of the tested models can be used in any part of the country, and all are Energy Star-qualified. Pay particular attention to low-temperature wind resistance if you live in the Midwest or in regions prone to high winds and chilly temperatures. Rain resistance might be more important for areas between Texas and the Florida panhandle.

Also base your choice on whether you need standard or custom sizes and partial or full replacements. Partial or pocket replacement leaves the existing window frame in place. Full replacements change the frame as well.

Our **Ratings** rank windows by overall score within each type. **Quick Picks** highlights models that combine performance, value, and features.

QUICK PICKS

Best overall:

- 3 Andersen \$350
4 Pella \$215, CR Best Buy
5 Andersen \$235, CR Best Buy
17 Pella \$255, CR Best Buy

All are top performers. The Andersen (3) is the only clad-wood window of this group that is available in custom sizes. The clad-wood Pella (4) was excellent overall and cost almost \$200 less than the top-scoring Marvin (1) and \$100 less than the other top-scoring Marvin (2). But the Pella (4) and Andersen (5) can be used only for full-replacement installations and aren't available in custom sizes. The fiberglass Pella (17) was excellent overall but also comes only in standard sizes.

Almost as good for less; both are CR Best Buys:

- 11 Reliabilty** \$180
- 13 American Craftsman** \$220

These vinyl windows had very good performance down the line and were convenient to use. The Reliablilt is sold in custom sizes at Lowe's, but only for partial replacement installations. If you need a full-replacement model, choose the American Craftsman, available through Home Depot.

For more information

Free: The pros and cons of different types of windows, including double-hung, casement, slider, and awning models, is available at www.ConsumerReports.org. Click on Home & Garden, then on windows.



Andersen








11 Reliabilit



27 Pella

replacement windows

- **Availability** Most models at stores through 2008.

 Excellent
  Very good
  Good
  Fair
  Poor

Within types, in performance order. Blue key numbers indicate Quick Picks.

Brand & model	Price	Overall score	Test results	Specs	Features
<p>Similar models, in small type, are comparable to tested model.</p>		<p>0 100</p> <p>P F G VG E</p>	<p>Wind resistance</p> <p>30° F outdoors</p> <p>70° F outdoors</p> <p>Rain resistance</p> <p>Durability</p> <p>Convenience</p> <p>J-factor</p>	<p>Partial replacement</p> <p>Full replacement</p> <p>Custom sizes</p>	

CLAD-WOOD

	Product	Price	Weight	Warranty	Score	Value	Quality	Service	Support	Overall
1	Marvin Clad Ultimate	\$400	88	5	95	95	95	95	95	95
2	Marvin Wood Ultrex Integrity	315	87	5	90	90	90	90	90	90
3	Andersen 400 Series Tilt Wash Woodwright	350	85	5	90	90	90	90	90	90
4	Pella ProLine	215	82	5	85	85	85	85	85	85
5	Andersen 200 Serie: Tilt-Wash	235	80	5	85	85	85	85	85	85
6	Pella Designer Series: Precision Fit	600	79	5	80	80	80	80	80	80
7	Peachtree 500 Series	350	78	5	80	80	80	80	80	80
8	Crestline Select Clad	340	66	5	75	75	75	75	75	75
9	Weather Shield Weather Shield Custom Shield	395	56	5	70	70	70	70	70	70
10	Jeld-Wen Premium Wood Tradition Plus	360	50	5	65	65	65	65	65	65

VINYL

CR	BEST BUY	Rank	Product	Price	Score	Value	Reliability	Performance	Quality	Service	Warranty	Overall
		11	Reliablitt (Lowe's) 5600	180	73	0.31	●	●	●	●	●	●
		12	Alsida UltraMaxx Replacement	395	70	0.30	●	●	●	●	●	●
CR	BEST BUY	13	American Craftsman (Home Depot) 9500 Series	220	65	0.32	●	●	●	●	●	●
		14	CertainTeed Bryn Mawr II New Castle XT	250	62	0.31	●	●	●	●	●	●
		15	Crestline CrestFit Vinyl	255	61	0.29	●	●	●	●	●	●
		16	Pella ThermaStar 25 Series	215	60	0.32	●	●	●	●	●	●

FIBERGLASS

UK BEST	17 Pella Impervia	255			0.33	• •
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¹ Exterior clad in aluminum. ² Exterior clad in fiberglass. ³ Exterior clad in vinyl. ⁴ Price includes triple-glazing and slide-in blinds/shades.

Guide to the Ratings

Overall score is based on wind and rain resistance, durability, and convenience. All tests but convenience were conducted by an outside lab. **Wind resistance** measures each window's ability to keep out 25 mph winds at outdoor temperatures of 0° and 70° F. **Rain resistance** measures their ability to keep out heavy, wind-driven rain. For **durability**, we evaluated how well each model maintained its wind and rain resistance after a week's worth of severe temperature changes. **Convenience** assesses how easy the window was to open and close, how easy its sashes tilted back for cleaning, and whether it had helpful features such as full-length handles, and a handle for the top sash. **U-factor** measures how well the window prevents heat from escaping; the lower the number, the better. U-factor was supplied by the manufacturer. Previous checks have found them to be accurate. **Partial replacement** refers to replacing the windows installed in existing frames; **full replacement** involves either a new opening or a strip-down to the bare opening. **Custom sizes** means the product can be made to order. **Price** is approximate retail for a 3x5-foot double-hung window with double-glazing, low-E coating, and argon gas. It does not include installation or other options.

or very good durability showed no change or little change in performance, respectively. Only the Andersen 200 and the Weather Shield clad-wood windows weren't as air- or water-tight as before.

Vinyl is inexpensive and convenient.

It makes up about half of the replacement window market mostly because it's relatively inexpensive and maintenance-free. But vinyl windows tend to leak air a bit more in cold climates. Vinyl also doesn't have the same visual appeal as wood, and it can't be painted or stained. So it might not be appropriate for older homes.

More companies offer installation.

Andersen, Marvin, and Pella recommend installers specifically trained on their products. Andersen's Renewal brand and Marvin's Infinity line are sold only to authorized installers. Both of those windows performed very well in our tests, but we didn't include them in our Ratings because we couldn't buy them anonymously, as is our policy.

You might want to go with a manufacturer-recommended installer anyway. Readers who did were more satisfied overall than those who used contractors employed by or recommended by Home Depot or Lowe's, according to our recent Home Improvements Survey. For more tips on hiring an installer, see Doing It Right.

HOW TO CHOOSE

Replacing windows is expensive. Half of the readers in our survey spent \$8,000 or more, and 16 percent spent \$15,000 or more. Keep these tips in mind:

Weigh partial vs. full replacement. If the old window frame is structurally sound, level, and plumb, consider changing only the window instead of replacing the entire frame to save on installation costs.

Pick a frame material. Vinyl and clad-wood windows remain popular. Aluminum windows have all but disappeared because they readily conduct heat. Fiberglass is available in dark colors and can be painted.

Match your climate. Use our Ratings to identify windows with the performance you need. For example, if your home is exposed to high winds and cold tempera-

tures, look for a window that excelled at low-temperature wind resistance. Then use the National Fenestration Rating Council and Energy Star labels to match each window's U-factor and solar heat gain coefficient to your area.

Customize performance. Even if you're buying clad-wood windows for the rest of the house, consider buying vinyl or fiberglass windows for areas near or below grade. Termites and other pests find those materials less attractive. Triple glazing (three panes of glass) can increase energy savings, but it also increases the length of the payback period.

Check the warranty. Product warranties typically cover the seal between the panes of glass separately from the sash, frame, and other parts. They can range from one-year to "limited lifetime." So carefully read over the exclusions.

claimcheck

THE GREAT UNWASHED?

The claim. You might not be able to see it, but Andersen's 400 Series windows have a sunlight-activated, titanium-dioxide coating that the manufacturer says "reduces water spots up to 99 percent." It also promises "easier cleaning" of its outside glass.

The check. We decided to shed some light on the subject by comparing the 400 to its titanium-coating-less cousin, the Andersen 200 Series. We kept both windows on our roof. We also applied greasy stains to part of the exterior to see how the coating combated staining, in case the birds didn't get to them.

CR's take. After three months, we examined both windows. One stain was gone and the other remained on each window. But no matter how hard we looked, neither window was cleaner than the other.

doingitright

HOW TO FIND AN EXPERT INSTALLER

Good windows installed badly won't deliver the look, comfort, or savings you expect. So in addition to getting multiple bids and detailed contracts, here are some specific tips on choosing a window pro:

Seek certification. Many major window manufacturers train and certify installers on their specific lines. Using the same contractor for purchase and installation can avoid finger-pointing if there is a problem later. Also look for certification from the American Window & Door Institute at www.awdi.com or InstallationMasters at www.installationmastersusa.com.

Interview the installer. Go online and read the installation instructions for the window you've chosen. Ask whether the installer plans to follow them—down to details such as the type, amount, and placement of flashing and insulation. If not, he should be able to explain why. Remember that some changes could void the warranty.

Know what to expect. Any seasoned installer should be able to tell you how long the actual installation should take. Ask about the installation process. It's better if each new window is put in immediately after the old one is removed. If one

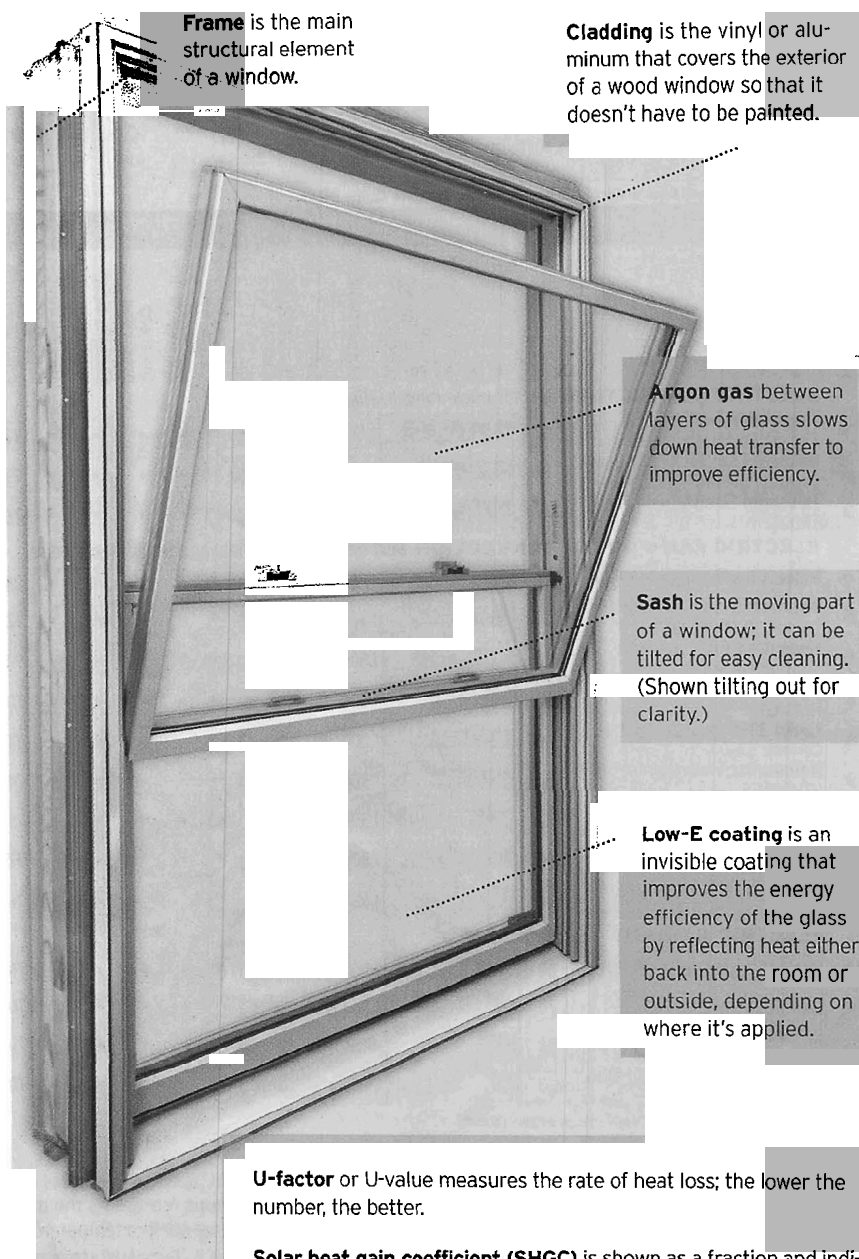
crew removes all the windows first and another installs, you'll be left with multiple openings for the duration. And be sure the installer measures each replacement window before he rips out the old one. Otherwise, you could end up with a boarded-up hole waiting for the right window to arrive.

Mind the little details. If you want to paint around the windows, have the installer use acrylic-latex caulk, which is paintable, not silicone. And be sure the window works well before the installer applies interior trim.



WINDOWS

Clear choices



Frame is the main structural element of a window.

Cladding is the vinyl or aluminum that covers the exterior of a wood window so that it doesn't have to be painted.

Argon gas between layers of glass slows down heat transfer to improve efficiency.

Sash is the moving part of a window; it can be tilted for easy cleaning. (Shown tilting out for clarity.)

Low-E coating is an invisible coating that improves the energy efficiency of the glass by reflecting heat either back into the room or outside, depending on where it's applied.

U-factor or U-value measures the rate of heat loss; the lower the number, the better.

Solar heat gain coefficient (SHGC) is shown as a fraction and indicates how much of the sunlight that hits a window makes it inside as heat. For cold climates, look for the highest number you can find; in warm climates, 0.40 or less; temperate areas, 0.55 or less.

Visible transmittance (VT) measures how much visible light a window lets in. The higher the VT, the better

"Stop throwing money out your old windows," warn some manufacturers' commercials. While new windows can reduce your energy bill, don't expect to recoup your investment anytime soon.

New windows can save you between 10 and 25 percent per year on heating and cooling if you have single-paned windows. But they cost between \$7,000 and \$20,000 for an average house. Custom sizes can add about 15 percent. So new windows probably won't save enough energy for you to pocket any net savings for 20 years or more. But they can make your home more comfortable, quiet, and attractive.

Finding an energy-efficient window has become easier, as insulating features such as heat-reflecting, low-E coatings and argon gas between glass panes have become standard on many lines. You'll also find many new options and extras, including fiberglass window frames.

We tested 19 windows for air and water leakage, durability, and convenience, with the aid of an outside lab. Months of testing found significant differences between brands and types, plus a spot-reducing coating that wasn't a clear winner (see Claim Check).

Wood and fiberglass are top scorers. Typically more expensive than vinyl, the clad-wood and fiberglass windows we tested from major brands, such as Andersen, Marvin, and Pella, excelled at keeping out cold air and rain when new. We subjected each window to a week's worth of extreme temperature swings that force window components to flex, expand, and contract. Then we tested again for air and water leakage. Models with excellent

element or a quartz tube, and are ideal for spot heating. But that heat quickly dissipates when the unit is off.

Assess portability. If your heater will see duty in many rooms, you'll want a model that's easy to move. Most electric models are lighter than kerosene or propane models. Still, the electric TaiChi and the DeLonghi SafeHeat Oil Filled TRD0715T, \$70, weigh a hefty 26 pounds. Look for a handle that provides a safe grip.

Play it safe. Overloaded, undersized, or frayed power cords are a major cause of fires, injuries, and deaths associated with space heaters. Inspect your power cord to ensure it's in good condition. If you need to use an extension cord, get a 12- or 14-gauge model. All of the tested electric models have a power cord that's at least 70 inches long. A longer cord gives you greater flexibility in where you can place the heater.

CR Quick Recommendations

The **Ratings** list models by overall performance. The **Quick Picks** below combine specific strengths and value:

QUICK PICKS

If you want a small or thin unit:

2 DeLonghi \$80

4 Pelonis \$110

6 Honeywell \$30

All three models deliver excellent temperature control. The flat-panel DeLonghi is quieter since it lacks a fan, and this lightweight model can be mounted on a wall. The diminutive Pelonis and Honeywell have longer power cords, providing more placement options without an extension cord. The Honeywell is very noisy.

If you prefer a baseboard look:

1 Honeywell \$60, CR Best Buy

This heater is designed for placement along a wall, keeping it out of the middle of the room. Very safe to use, this model runs quietly and offers excellent temperature control.

If you want direct heat:

13 Holmes \$60, CR Best Buy

Using quartz-tube elements to heat, the Holmes offers excellent temperature control and 750- and 1,500-watt settings.

Buy a heater listed by Underwriters Laboratories, whose mark indicates it meets UL's voluntary safety standards. And consider a model with a tip-over switch and an automatic shutoff for over-

heat protection. Place your heater at least 3 feet from furniture and window treatments and out of the reach of children or pets. And always turn off the heater when you go to bed or leave home.

Ratings space heaters

• **Availability** Most models in stores through January 2008.

Excellent Very good Good Fair Poor

Within types, in performance order. Blue key numbers indicate Quick Picks.

Brand & model		Price	Overall score	Test results	Features								
Key num			0100	Output (watts)	Safety	Temperature control	Noise	Ease of use	Tip-over switch	Overheat protection	Multiple heat settings	Thermostatic control	Cord length (in.)
ELECTRIC CONVECTION <i>Best for whole-room heating, and quiet.</i>													
1	Honeywell Low Profile Convection Heater HZ-519	\$ 60	82	1,500	●	●	●	●	●	●	●	●	72
	DeLonghi SafeHeat Flat Panel Micathermic HHP 1500	80	76	1,500	○	●	●	●	●	●	●	●	71
3	DeLonghi SafeHeat Oil Filled TRD0715T	70	71	1,500	○	●	●	○	●	●	●	●	76
ELECTRIC FAN-FORCED CONVECTION <i>Best for whole-room heating, but fan makes noise.</i>													
4	Pelonis Disc Furnace VHC-461	110	79	1,500	●	●	●	●	●	●	●	●	85
5	Vornado Vortex Heat Touch-Stone 500 EHI-0032-28	150	74	1,500	●	●	●	●	●	●	●	●	72
	Honeywell Mini Tower 360 Surround HZ-2200	30	74	1,500	●	●	●	●	●	●	●	●	94
7	Holmes Transformable Tower HCT 460	80	69	1,500	●	○	●	●	●	●	●	●	70
8	Lasko 30-in. Pedestal Digital Ceramic 5350	60	69	1,500	●	○	●	●	●	●	●	●	74
	Holmes Oscillating Heater HFH5606	50	64	1,500	●	●	●	●	●	●	●	●	74
	Lasko Oscillating Ceramic Tower 5565	70	62	1,500	●	○	●	●	●	●	●	●	75
	Bionaire SafetySmart Tower BSH 3850	60	60	1,500	●	●	○	●	●	●	●	●	72
12	Fujitronic TaiChi Bio-Flame FH-779P	130	60	1,350	○	●	○	○	●	●	●	●	76
ELECTRIC RADIANT <i>Best for spot heating.</i>													
13	Holmes Quartz Tower HQH319	60	68	1,500	○	●	○	●	●	●	●	●	70
14	Lakewood Radiator 205	70	44	1,320	●	●	○	○	●	●	●	●	70
	SofeusaAir Oscillating Reflective MS-09	50	20	800	●	●	●	●	●	●	●	●	70
16	EdenPure Quartz Infrared 1000 Heater	400	20	1,500	○	○	○	○	●	●	●	●	70

† Instructions indicate you should not use an extension cord.

Guide to Ratings

Overall score is based on a weighted average of safety, temperature control, noise, and ease of use. Displayed scores are rounded; models are listed by precise overall score. **Output** represents the maximum rated output of a heater in use. **Safety** indicates results of tests for contact-surface temperatures, safety controls, the likelihood the heater will create a fire hazard, and cord length. **Temperature control** denotes how well a heater controlled the temperature in our test room. Top-rated models held room-temperature variations to less than 3° F. With the poorest performers, it varied by more than 6° F. **Noise** represents our measure of the peak operating noise levels of each heater during a typical operating cycle. **Ease of use** denotes our evaluation of size, weight, cord length, accessibility, and the ease of use of controls and handles. **Tip-over switch** indicates that a model is equipped with this safety feature, which shuts down the heater when it is knocked over. **Overheat protection** denotes that the heater will shut off when a sensor reaches a certain heat. **Multiple heat settings** indicates the heater has different wattage settings. **Thermostatic control** indicates the heater is equipped with a thermostat. **Cord length** represents the length in inches of the heater's power cord. **Price** is approximate retail.

Save hundreds on
ENERGY COSTS

SPACE HEATERS

Add comfort with ease



ELECTRIC COMPANY
The Holmes Quartz Tower, \$60, Pelonis Disc Furnace, \$110, DeLonghi SafeHeat Flat Panel, \$80, and Honeywell Low Profile Convection, \$60 (clockwise from far left), all provide a 1,500-watt output and are top performers in their categories.

Sales of space heaters are sizzling as millions of homeowners buy into the promise of lower-cost heating in an era of soaring utility bills.

Our tests of the latest electric heaters show that they provide more-consistent heat than those we last tested. And while they're also safer, space heaters still account for 40 percent of the deaths and 30 percent of the injuries each year in this country that are heating related, according to the U.S. Fire Administration. Fuel-fired models carry their own risks (see Safetywise).

All of the tested heaters will comfortably warm a chilly room. But remember, the only way to potentially save money is to use a heater in one room and leave the rest of the house chillier.

Temperature control is key. Most of the heaters controlled room temperature well. Eight models with a thermostat excelled, maintaining temperature within 3° F or less. Buy a heater without one, and you'll have to turn it off at the desired temperature and on again to heat. Heaters with multiple output settings let you choose the lowest one that keeps a room comfortable, saving energy.

Safety varies among models. The Bonaire Safety Smart Tower, \$60, distin-

guishes itself with a sensor that turns off the heater when the grille is touched. A tip-over switch that shuts down a knocked-over heater is another desirable feature; five tested models lack one.

High-priced models disappoint. The EdenPure Quartz Infrared 1000 Heater, \$400, and Fujitronic TaiChi Bio-Flame FH-779P, \$130, earned the lowest overall scores. The EdenPure provided only fair temperature control and ease of use. Its

boast that it can cut heating bills by up to half is questionable. The TaiChi, equipped with an air purifier, provided lackluster temperature control, cleaned the air poorly, and lacks an overheat-protection feature.

HOW TO CHOOSE

Opt for convection or radiant. Convection heaters, whether fan-forced or not, are best for heating an entire room. Radiant heaters use an electric-ribbon

safetywise

PROPANE & KEROSENE HEATERS CAN POSE RISKS

Propane- and kerosene-fueled heaters are prodigious heat producers. But because of their open flames, the risk of carbon-monoxide poisoning, and the hazard associated with handling the fuel, it's best not to use them indoors, except in areas with good ventilation.

We tested two propane models, the Mr. Heater Tough Buddy MH18B, \$140, and the Charmglow Blue Flame Heater With Thermostat CGL300TB, \$200, and two that use kerosene, the DynaGlo Radiant RMC-55R7 \$100, and the DuraHeat Portable DH2304, \$125. None fared well in our safety tests and all produced a small but measurable level of CO and emitted particulates, though not

enough to be a serious hazard. The propane models have a low-oxygen shutoff valve; the kerosene heaters, a tip-over switch.

Still, these heaters can be useful. During a winter power outage, you might use one to keep water pipes in an uninsulated basement from freezing, for example.

Before you operate a fuel heater, contact your building department about usage restrictions. Never move it while it's in use, and regularly clean and inspect it. During a power outage, place the heater in the center of a well-vented room that has battery-powered carbon-monoxide and smoke alarms. Monitor the heater continually, and turn it off when you go out or to bed.

noted in the Ratings and can be easier to use than those with an array of buttons. Models that switch automatically between heating and cooling are also a plus where days are warm and nights get below freezing, as are those that clearly show whether they're running the heat or air conditioning. While most have batteries that save at least part of a customized program after a blackout, some save all of it. One, the Lennox Signature Stat, works completely off home wiring yet can fully save programs. But at \$345, it's pricey.

Consider the installation. Most programmable thermostats attach to your heating or cooling system with as few as two low-voltage wires, making installation easy. Just be sure to check which wire goes where before removing your old one.

CR Quick Recommendations

The **Ratings** rank models by overall performance within types. **Quick Picks** lists models with performance and value.

QUICK PICKS

Lots of options for varied schedules:

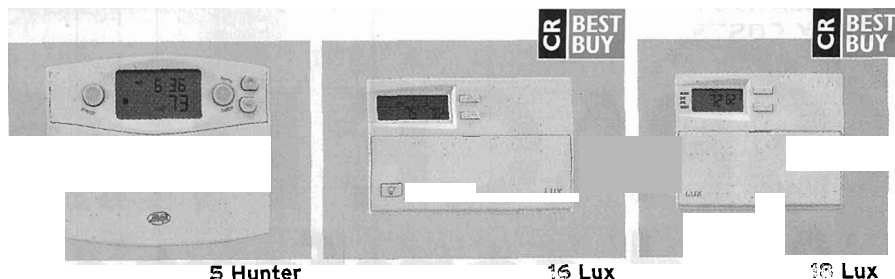
- 1 Lux \$80, CR Best Buy
- 3 Lux \$60
- 4 White Rodgers \$125
- 5 Hunter \$55
- 6 CTC \$75

All let you program a different schedule for all seven days. The Lux (1) is especially easy to program and includes a clear prompt that makes its override mode easier to see than most. The Lux (3) and Hunter have screens that were easier to read, and the CTC offers similar performance at a similar price. The White Rodgers works with multistage heat pumps and has a clear override display.

For those with less-varied schedules:

- 16 Lux \$50, CR Best Buy
- 17 Honeywell \$70
- 18 Lux \$35, CR Best Buy
- 19 Honeywell \$60
- 20 Hunter \$45

Among these weekday/weekend models, the Lux and Honeywell models are easiest to program. Choose the low-priced Lux (18) or Hunter if you're willing to trade some conveniences and an easy-to-see override display for a low price.



Ratings thermostats

• **Availability** Most models in stores through June 2008.

Excellent Very good Good Fair Poor

Within types, in performance order. Blue key numbers indicate Quick Picks.

	Brand & model	Price	Overall score	Test results	Features
Key number	Similar models, in small type, are comparable to tested model			Temperature	Programming
				Display	Full save for time/program
					Auto changeover for heat/cool
					Shows it's running heat/cool
SEVEN-DAY MODELS These let you program a different schedule every day.					
1	Lux Smart Temp Touch Screen TX9000TS	\$ 80	85	●	●
2	Lennox SignatureStat	345	74	○	●
3	Lux TX9000 Ace ATX9000 (Ace Hardware)	60	73	●	●
4	White Rodgers 90 Series Blue IF95-1277	125	73	○	●
5	Hunter Set & Save 44360	55	73	●	●
6	CTC 43503	75	72	○	●
7	Robert Shaw 9700i	145	70	○	●
8	White Rodgers IF97-371	115	69	○	●
9	Trane XL800 Series TCONT800	200	66	○	●
10	Honeywell RTH7500 YRTH7500D1009	100	62	○	●
11	Honeywell VisionPRO 8000 TH8110U1003	130	61	○	●
12	Rite Temp 8050C (Home Depot)	40	55	○	●
13	Bryant Preferred Series TSTATB8PRF01	300	52	○	●
14	ICM Controls Simple Comfort SC3000	45	48	○	●
15	Rite Temp 8082C (Home Depot)	100	43	○	●

WEEKDAY/WEEKEND MODELS One schedule for weekdays; one or two for weekends.

16	Lux Smart Temp TX1500 Ace ATX1500 (Ace Hardware)	50	86	●	●
17	Honeywell FocusPRO 6000 TH6110D1021	70	80	●	●
18	Lux Smart Temp TX500	35	80	●	●
19	Honeywell RTH6300B	60	77	●	●
20	Hunter Set & Save 44155	45	72	●	●
21	White Rodgers IF90-371	115	67	○	●
22	Honeywell RTH7400D YRTH7400D1002	80	64	○	●
23	Hunter Set & Save 44260	45	63	○	●
24	Hunter Set & Save 44110	30	61	○	●
25	Rite Temp 8022C (Home Depot)	35	49	○	●

1 Has touch screen. 2 Does not work with heat pumps. 3 Can handle multistage heat pumps. 4 Wireless; can program remotely from any room. 5 Has Saturday and Sunday schedules.

Guide to the Ratings

Overall score is based mainly on temperature performance, programming ease, and display visibility. Displayed scores are rounded; models are listed in order of precise overall score. **Temperature** is the ability to maintain steady temperatures based on the difference when the thermostat turns the heating or cooling system on and off. Temperatures for highest scorers varied by just over 1° F; lowest by about 5° F. **Programming** denotes ease of setup and making routine adjustments and changes to setback programs, including overrides. **Display** includes clarity at arm's length (2 feet), in subdued room light, while lighted and unlighted, and at night. **Price** is approximate retail.

THERMOSTATS

Some make saving easier

CLEAR CONTROL

The top-scoring Lux Smart Temp TX9000TS, \$80, left, was among the thermostats that were easiest to program in our tests.

Large readouts help avoid energy-wasting goofs.

Backlighting makes the display easier to read in dark hallways and at night.

A bold "hold" prompt reminds you when you're overriding the energy-saving mode.

System status, showing whether heat or A/C is activated, is indicated by words or icons.

Touch screens ease programming via a touch-sensitive menu.

Programmable thermostats can help save energy by automatically raising or lowering temperatures at night and when you're away. But confusing controls on some can make it easy to burn more energy than you bargained for.

The fact that thermostats can be hard to use is a primary reason the U. S. Environmental Protection Agency is reconsidering its Energy Star certification. "Programmable thermostats can save significant energy, but only when programmed correctly," says Maria Vargas, an EPA spokeswoman. "We've found there's a margin for error that leads to energy waste." Indeed, many people assume that no programming is needed for these products, Vargas adds. The agency is proposing an educational program, and will work with the industry to make thermostats friendlier.

Manufacturers have taken some steps to make programmable thermostats less daunting. Today's have built-in energy-saving programs that are designed to cut heating and cooling costs by up to 20 percent, eliminating the need to create programs from scratch. But you'll still have to set the time, date, and the system they'll control. Odds are you'll also want to tailor those programs to your schedule.

Our Ratings include 25 models, with CR Best Buys that cost as little as \$35. But months of testing confirmed that some make programming far more onerous than others, regardless of price. And while most are good at showing and maintaining the temperature you set, we found several exceptions. Here are the details:

Two are tough to program. Clear on-screen prompts and intuitive controls help make saving energy easier. But simply setting the time on the \$300 Bryant Preferred Series involves a long list of steps that could encourage mistakes. (The model is being discontinued.) A screen that shows numbers instead of days also helped to make programming dates on the \$45 ICM Controls Simple Comfort seem like rocket science.

Two are hard to see. A display should be easy to read at arm's length. Glare and tiny letters made reading two of the Rite Temp models we tested a challenge. All programmable thermostats let you override their energy-saving modes. Some use bold letters or lights to tell you the override is on. The ICM and the RiteTemp 8022C are among those with override prompts that are relatively easy to miss.

Some blow hot and cold. Most models kept temperatures steady by quickly

activating the heating or cooling system. Models judged less than very good let temperatures rise and fall several degrees more than others, which could prompt you to override the program.

One was less accurate. Displayed temperatures for most were accurate to within one or two degrees. All three samples of the Bryant read up to four degrees too high, which could make you uncomfortable enough to raise or lower temperatures.

HOW TO CHOOSE

Our Ratings and Quick Picks include several thermostats that are easier than most to program. Most models work with most heat-pump systems, though only a few work with multistage heat pumps.

Once you've matched the programmable thermostat to your system, consider these shopping points before buying:

Pick the programs you want. If you have a regular schedule, consider a weekday/weekend model, which offers one energy-saving program for weekdays and one or two for Saturday and Sunday. Models with different programs for all seven days are often pricier, though several cost no more than simpler models.

Look for convenience. Thermostats with touch-sensitive screens are foot-

lumen measurement is the amount of light provided. Check the packaging to find a CFL that delivers as many lumens as the bulb it's replacing and uses the fewest watts.

Choose the color. Energy Star CFLs labeled "soft white" or "warm white" are designed to match the light of a typical soft white bulb. Those labeled "bright white," "daylight," or "natural" have a cooler blue color, comparable to a bright white incandescent. Though some colors can appear different under fluorescent light, most of our panelists using soft white CFLs didn't notice any change.

safetywise

WHAT TO DO IF A CFL BREAKS OR SMOKES

CFLs contain small amounts of mercury, a neurotoxin. If a bulb breaks, follow these instructions from the U.S. Environmental Protection Agency:

- Open the windows and leave the room for at least 15 minutes.
- For hard floors, don't vacuum or sweep the mess. Instead, wear disposable rubber gloves and use cardboard or stiff paper to scoop up the debris. Then clean the area with a damp paper towel.
- For rugs, use sticky tape to pick up any fragments and powder. Then vacuum the area if necessary.
- Place the debris and cleanup materials into a plastic bag and seal it. Put that bag into another plastic bag and seal it.
- If your area allows it and no other disposal or recycling options exist, place in the trash outside. Wash your hands.
- After vacuuming the area for the first time, remove bag or empty and wipe bin. Put bag or debris into a plastic bag and seal it. Then put that bag into another plastic bag and seal it. Place in the trash outside. Wash your hands.

Although it's rare, some CFLs smoke, smell, or darken at the base when they burn out. Currently all CFL materials must be self-extinguishing, so they won't catch fire, according to Energy Star.

If your CFL has a dramatic end, turn off power to the CFL. Once the bulb has cooled, remove it. Then send an e-mail message with a photo of the bulb and its make and model to cfl@energystar.gov.

CFLs VS. REGULAR BULBS

Compact fluorescent lights last far longer than incandescents. And as the chart shows, they're typically more than four times more efficient. Note that some CFLs reach full brightness faster than others; 8 or 9 seconds might not sound like much, but it might seem longer if you're waiting in a dim room.

Brand & model	Bulbs per pack	Price per pack	Specs	Test results			
Within types, in alphabetical order.				Claimed lumens	Actual lumens (initial)	Efficiency (lumens/watts)	Run-up time (sec.)
TABLE/FLOOR SPIRAL Equivalent to 60-watt soft white incandescent bulb.							
Bright Effects 60 Watt Replacement 4/Pak 146558 (Lowe's)	4	\$ 8.00	800	819	70	25	
Feit Electric 60 Watt Replacement ESL13T	4	9.00	800	786	68	30	
GE Soft White 60 Watt 8000 Hour Long Life 41525	2	9.00	950	914	68	34	
N-Vision Mini Spiral Soft White 423-599 14/60 Watt (Home Depot)	4	8.00	900	863	65	25	
Philips Marathon 60 Energy Saving Bulb 8 pk. 148031 (Costco)	8	11.00	900	907	66	29	
Typical 60-watt soft-white incandescent bulb	4	2.40	850	847	14	Less than 1 sec.	
FLUSH MOUNTED SPIRAL CEILING LIGHT Equivalent to 60-watt soft white incandescent bulb.							
Feit Electric ECObulb 60 Watt Replacement BPESL13T	3	9.00	900	936	70	27	
GE Soft White 60 Watt 8000 Hour Long Life 41525	2	9.00	950	914	68	34	
N-Vision Mini Spiral Soft White 423-599 14/60 Watt (Home Depot)	4	8.00	900	863	65	25	
Philips Marathon 60 Energy Saving Bulb 8 pk. 148031 (Costco)	8	11.00	900	907	66	29	
Typical 60-watt soft-white incandescent bulb	4	2.40	850	847	14	Less than 1 sec.	
RECESSED FLOOD CEILING LIGHT Equivalent to 65-watt soft white incandescent flood bulb.							
Feit Electric 65 Watt Replacement BPCE15R30H/4 877397 (Costco)	4	12.00	750	754	50	117	
GE Floodlight Soft White 65 Watt 49897 8000 Hour Long Life 20708	1	7.00	720	630	43	131	
N-Vision Soft White BR30 14 Watt 65 Watt EDXP-30-14 (Home Depot)	2	10.00	640	695	50	124	
Philips Marathon Energy Saver Reflector Flood 16W=65W ELIA BR30	1	11.00	630	682	41	145	
Sylvania 16 Watt Flood 65 BR30	1	8.00	750	711	44	94	
Typical 65-watt soft-white incandescent bulb	2	10.00	755	579	9	Less than 1 sec.	
OUTDOOR LIGHTS Equivalent to 60-watt incandescent bulb							
Feit Electric ECObulb 60 Watt Replacement Household Soft White BPESL16AT	1	6.00	800	722	51	97	
GE Postlight 40 Watt 49894 6000 Hour Long Life	1	7.00	520	548	53	199	
N-Vision Mini Spiral Bright White 150-127 EDXO-14 (Home Depot)	4	8.00	800	914	67	52	
Philips Energy Saver 60 Outdoor Post Light Soft White 14 = 60 Watt 15289	1	7.00	720	794	59	109	
Sylvania Soft White Mini 60 Watt 13W	4	8.00	800	828	65	36	
Typical 60-watt soft-white incandescent bulb	4	2.40	850	847	14	Less than 1 sec.	

(1) Covered bulb. (2) Spiral.

Notes on the table

The table lists tested CFLs by type, in alphabetical order. **Bulbs per pack** is the number of bulbs in a package. **Price per pack** is approximate retail price. Prices vary depending on where you buy the bulb, and how many are in a pack. **Claimed lumens** refer to manufacturer's bulb brightness claim. **Actual lumens** is the average bulb brightness, as measured in the lab. **Efficiency** states the lumens generated per watt. **Run-up time** is measured in seconds and represents the time needed until the bulb reached 80 percent of full brightness.