

**Y**ou could always try just visualizing a beautiful warm beach. But if winter's chill had your house feeling more like an igloo and your utility bills made you equally uncomfortable, it may be time to take some more concrete steps.

Think of it as energy-smart investing, planning now for improvements that will make this summer and next winter more tolerable. A small investment – a few dollars spent on weather stripping, for example – can quickly pay for itself in reduced heating and cooling bills if you successfully plug a costly leak. And larger investments have the potential to generate even greater cost savings over the course of a few years.

Not every energy-saving gadget or technique is necessary or appropriate for every home. Each home has different characteristics and different needs. And saving on bills is only one reason to invest in your home – your comfort and the home's appearance are others.

But in general, energy experts can point to some typical measures that have the potential to not only pay for themselves over time but to make your home more valuable and more environmentally sound. Depending on your budget and your home's particular needs, here is a look at some energy-smart investments.

If You Have  
**\$1,000**  
TO SPEND

### GET AN ENERGY AUDIT

Estimated Cost: \$200 – \$500

Yes, that is a lot of money for something that is not, in and of itself, going to reduce your utility bill one penny and will, in all likelihood, lead to further expense. Why pay for an expert to tell you that you have a drafty house when you already know that from experience?

Paul Kriescher, an energy analyst with Lightly Treading in Denver, likens it to going to a doctor when you are sick. "When you have an ailment and you diagnose the problem yourself, you may get it right some of the time," he says. "But isn't it really better to see a professional? Too many people do things like replacing their furnace when the furnace wasn't really the problem. You really need to understand how your house works."

There are lots of energy wasters that home owners, armed with a checklist, can identify and correct by themselves. But professionals can track and quantify air leaks, study the structure of the house, thoroughly examine past utility bills and recommend which future home investments really will produce significant energy savings and which won't.

### SEAL AIR LEAKAGES

Cost varies depending on the kind of leakage

Air sealing specialists have gotten quite sophisticated about tracking down air leaks in a home – and they are frequently not where you would expect them. "It's rarely from the windows or places you can see," says Kriescher. "Often, you'll find the real air leaks down in the basement, maybe behind a stairwell."

Using a tool called a blower door, specialists can measure precisely



how much air is leaking from the house, and locate and plug those leaks – whether in the attic or basement. Sealing leaks in ducts, especially if they are in unheated spaces, can also provide a big bang for the buck.

### INSULATE THE ATTIC

Estimated Cost: \$100 – \$1,000

This is the No. 1 item on most homes' energy-saving priority lists. Most homes in the United States – especially those built before 1980 – do not have adequate insulation.

"Insulation in the attic is always the hands-down winner," says Ron Judkoff, director of the Buildings and Thermal Systems Center at the National Renewable Energy Laboratory in Golden, and an architect who has spent his career researching energy-efficient building techniques. "Blowing more insulation into the attic is one of the more cost-effective things you could do. A house that had very little insulation would wind up saving a lot. A house that already had some insulation but had room for some more would also experience some savings."

What's more, adding insulation can help reduce greenhouse gases – up to a half ton of carbon dioxide emissions per year per home, energy analysts say.

### GET A PROGRAMMABLE THERMOSTAT

Estimated Cost: \$30 – \$200

Programmable thermostats automatically adjust a home's temperature settings, cutting back on the heat at night while family members are asleep or during the day while everyone is out of the house, and raising the temperature just before it is time to get up in the morning or before everyone comes home in the evening.

Consistently lowering a home's temperature to, say, 63 degrees in winter and raising it up to 68 for only a few hours each day can easily recoup the cost of the thermostat within a single month, analysts say. For families in which no one is home during the day, this is a no-lose proposition.

And don't worry about pets getting too cold in a house heated to just 63 degrees, says Kriescher. "The pets don't really care. They've got fur coats, and they'll just find a sunny place to sleep."

While pets aren't a problem, techno-phobes are. And there is no point investing in a programmable thermostat if you leave it set on 68 degrees 24/7. "They're a big saver if people are comfortable working with them," Kriescher says. "It usually only takes one time to set up a program that's true to your life schedule."

Even so, a lot of people are simply baffled by the technological demands. Joe Hall, energy education coordinator for Sun Power, Inc., a non-profit organization that helps low-income home owners reduce their energy bills, says he always looks at the family's VCR when he is doing an energy audit. If it is blinking "12:00," he knows the family isn't a good candidate for a programmable thermostat. "If they've got a teenager or a kid, they'll know what to do with it," he says.

If You Have  
**\$5,000**  
 TO SPEND

**ADD INSULATION TO  
 THE WALLS, FLOORS  
 AND DUCTWORK**

Estimated Cost: \$1,000 – \$5,000

The cost can vary dramatically, depending on the size and age of the home, but experts suggest savings from wall insulation are almost as great as for ceiling insulation. Contractors can “drill and fill,” or blow insulation into cavities that have little or no insulation. If you are planning on doing some remodeling or want to add siding to the house, you have even more options. Any way you do it, adding insulation can produce significant energy savings, according to Judkoff.

**INVEST IN  
 ENERGY-EFFICIENT  
 WINDOW TREATMENTS**

Cost varies depending on the number of windows

Window treatments can be as inexpensive as applying a temporary film (available at any hardware or general merchandise store) to cut down on drafts and provide a barrier to heat loss. Another seasonal fix is putting up storm windows during cold weather, again providing one more barrier and layer of insulation.

Costlier but more stylish options include enclosing windows in insulating drapes, shades or quilts. Honeycomb fabric shades can trap air in the honeycomb cells, providing excellent insulation. In fact, the best-rated window shades can increase a window’s R-value (that is, its resistance to heat loss) by as much as 500 percent.



Energy audits reveal  
 that the furnaces in many homes  
 are only about 60 percent efficient,  
 meaning that 60 percent of the fuel you buy  
 actually goes to heating your home  
 while 40 percent  
**is wasted.**



**YOUR SOLAR ENERGY.  
 OUR SOLAR REBATES.**

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## REPLACE SINGLE-PANED WINDOWS WITH MORE ENERGY-EFFICIENT DOUBLE- OR TRIPLE- PANED WINDOWS

Estimated Cost: \$400 – \$600 per window

The secret to double- or triple-paned windows is the air between the layers. Those gaps provide the insulation and account for the greater energy savings over old single-paned windows. "If you have two air gaps versus one, you get about 30 percent more insulating quality to the window," says Judkoff. "You also get real good acoustics. It's quieter because the sound has to penetrate through extra panes of glass." The result can be a 10 percent to 20 percent savings on heating bills.

If money IS an object, try financing the project or replacing a few at a time. Focus on those rooms where you spend most of your time, or those rooms where you really don't want to be uncomfortable, experts advise. For most home owners, those are bedrooms, especially children's rooms, and the den or family room.

"You know your house, and you know where you're uncomfortable," says Dennis Brachfeld, an energy auditor with All About Saving Heat and Windows in Denver. "Where you spend time and where you're uncomfortable should be your highest priority."

## GET A NEW, MORE ENERGY-EFFICIENT FURNACE

Estimated Cost: \$2,500 – \$4,000

Studies suggest that the furnaces in many homes are only about 60 percent efficient, meaning that 60 percent of the fuel you buy actually goes to heating your home while 40 percent is wasted.

"You want to determine if your furnace or boiler is less efficient than 70 percent," says Kriescher. "If it's more than 30 years old, you can be pretty sure that it is. And even if it's newer, many units should be replaced."

A new high-efficiency (90 percent or above) furnace can generate a 20 percent to 35 percent savings in fuel costs. Investing in a new furnace can be cost-effective, even if the old furnace still has several useful years of service left.



I have  
a home I care about  
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a desire to help protect our environment

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# If You Have \$10,000 TO SPEND

## INSTALL SOLAR PANELS

Estimated Cost: \$10,000 or more

This is a step home owners should consider only after they have done all the cost-effective efficiency measures on their home. If the house is as well-insulated as it can be; if the furnace, air conditioner and appliances are all energy-efficient; and if the doors and windows don't leak air, the next step is to look into solar power. A photovoltaic panel is a set of silicon cells that produce electric power when exposed to light.

The cost of photovoltaic panels to power an average home would exceed \$10,000, but federal tax credits and rebates from Xcel have dropped the cost. Xcel is offering incentives of more than \$4 a watt for residential systems up to 10 kilowatts installed in its territory. This cuts the cost by about half.

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based on your home's  
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## DO A LITTLE OF EVERYTHING

With this much money to invest, home owners can do a lot of smaller projects: Replace all the windows. Replace several energy-hogging old appliances. Insulate all the ductwork. Replace older insulation with better-performing new insulation.

The key, say experts, is prioritizing and investing in such a way as to get the most bang for your buck based on your home's unique design and energy footprint.

"I had one client with 55 windows in her house, and she loved them," says Brachfeld. "But she said she couldn't live with all the drafts." One option would have been to replace all the windows with new, more energy-efficient windows. The cost, of course, would have been staggering.

But Brachfeld did something else. He inspected her boiler and found that it lacked proper ventilation. The boiler was sucking in air from all over the house, causing the windows to be drafty. By providing adequate combustion air to the furnace – a \$200 repair – Brachfeld resolved the draft problem efficiently and inexpensively.

With enough such energy-smart investments, the average home owner may be able to save enough to cover the cost of a real beach vacation.