

Self Help

Individuals acting together can accomplish a great deal. But the plain truth is that no matter how committed and energetic they may be, even acting in concert, individuals cannot do certain things: raise armies and navies or build post roads, for example. It is for such things that we have a government, and in the final analysis it is there that action must be compelled, which is the major reason for this book.

A number of self-help books are already on the market and in libraries. Yet it is amazing how much they miss. This is in part because they hang their premises on existing laws, and our laws encourage tunnel vision. They focus on certain lists of pollutants, such as those in the Kyoto Protocol, while ignoring many other causes of death, illness and global warming.

So, what follows is a stroll through various places to identify what might have been overlooked elsewhere. We examine some products in the average household, the supermarket, and the appliance store. But first, here's an anecdote to demonstrate what kind of results concerted action can have.

In April 1993, my wife and I bought a four-bedroom house in the Outer Banks of North Carolina, where I had been vacationing since high school in the 1960s. A thin strand of sandy barrier islands, the Outer Banks stretch about 120 miles from the Virginia line, as narrow as only 300 yards in some places, and whipped by winds that routinely reach 70 miles per hour. With almost no vegetation save sea oats and scrub brush, houses stand completely exposed to the wind. As it pierces every crack or crevice in the siding, windows and doors, it also drives rain under door sills and through the gaps in windows, sucking out the cool or warm air, in the process.

About four months later, on Aug. 22, 1993, Tropical Storm Emily formed in the Atlantic Ocean, drifted northwest, came to a standstill 1,000 miles east of Florida, then began moving toward the Outer Banks. Emily increased to hurricane force 3, which means a storm with winds 111 to 130 miles per hour on the Saffir-Simpson Hurricane Scale.

According to reports at the time, Emily struck the Outer Banks a glancing blow, with damage of only \$35 million. One of those damages was to our roof. It was ripped from the house, peeled back like the lid of a sardine can -- rafters, shingles and all -- and tossed about 200 feet down the beach. Rain fell for two days, so hard that the bathroom, still covered by what remained of the roof, had two inches of standing water. Everything was ruined, including the windows, which had been shaken so hard that the seals broke. The walls were sodden, and fiberglass insulation sagged through the ceiling.

This was, believe it or not, a stroke of good luck.

Only two weeks earlier, the electricity bill for July had arrived from the Cape Hatteras Electric Cooperative. Clearly the meter-reader had erred, because the bill was for \$821. Or so we thought.

But it was no mistake. It was just the price extracted by the sun beating down mercilessly on a house buffeted by constant high winds on islands served by a single, very expensive and very long power line. It was also a very powerful incentive to make the house as efficient as possible.

With the roof off and the house gaping, this was clearly a time for making lemonade out of lemons. So as the house was rebuilt, dozens of changes were incorporated. Attic insulation was tripled. In the walls, limited by their depth, insulation could only be increased by about one-third. Higher efficiency heat pumps were installed. Every light fixture was fitted with the highest efficiency florescent bulbs available. Every window and door and each joint in the siding was re-caulked. Water saving showerheads and toilets were installed. Windows and doors were tinted to reduce sunlight penetration, and hence warming.

One year later, the electricity bill for July 1994 arrived: \$321, after a one cent per kilowatt hour rate increase.

Obviously, savings of this sort were possible because the house was taken down to its studs, but this does illustrate the potential savings: over 60 percent.

So, let's start.

Never allow the words "climate change" to exit your mouth. It is "global warming"—always global warming.

The principal reason "climate change" is so widely used is that Republican pollster and political strategist Frank Luntz urged it on the GOP. He wrote in a memorandum that "while global warming has catastrophic communications attached to it, climate change sounds a more controllable and less emotional challenge."¹ Don't allow yourself to be victimized by double-speak.



Figure 1 On average, a solar system like this will cut water heating bills by 50 to 80 percent. (Source Hawaiian Island Solar.)

LOOKING AT A HOUSE

Start with the roof,
then move inside.

When it's time to replace the roof, if you live below or adjacent to the Mason Dixon line—that is, you have hot, sunny weather most of the year—make the new roof light colored, white if possible. That reflects heat, reducing cooling costs, up to 43 percent in one test² and 39.7 in another³. Also, add a ridge vent, which is a covered opening along the peak of the roof. It will allow hot air to escape, again reducing cooling costs. Make sure there's an exhaust fan, which will remove the built up heat that the ridge vent doesn't.

Is there a solar collector on that roof to heat water with sunshine? There should be. Properly installed—and admittedly this can be a challenge—the collectors will save money and reduce air pollution for decades. On average, a solar system will cut water heating bills by 50 to 80 percent.⁴ Every building in southern California, Florida, Arizona, Nevada and the rest of the sun drenched states should have a collector. The reason they don't? The gas and electricity companies would make less money, so at even the slightest suggestion, they savage proposals to install them.

If it's feasible, the south-facing roof should have an 18- to 24-inch overhang. It will keep the sunlight out in the summer when the sun is high in the sky, but let it in when it's low in the winter.

Windows should be double or triple pane, but just as important, latch them: They close tighter.

At places where exterior walls are penetrated—by electricity outlets, for example—install inexpensive foam inserts that reduce the loss of air that has been heated or cooled.

Obviously, install as much insulation as humanly possible, especially in the attic.

Windows and glass facing south—that's the direction the sunlight comes from—should have a so-called “low-E” film that bars the hottest of the sun's rays, or some other barrier such as shades.

HEATING AND COOLING

Supplement central air conditioning and heating with a window air conditioner in the summer and a space heater in the winter, so the whole-house temperature can be lowered or raised a few degrees.

Have a fireplace? Close the damper and fill it with decorations. If a cozy winter fire is essential, fill a can with dollar bills and light them, because that's what a fireplace does: burns up hard earned money. Just as



Figure 2 Fireplace inserts like this burn pellets made from sawdust, corn or other biomass, reducing emissions soot, or black carbon, up to 96 percent and tripling, or more, efficiency. (Source: Heavenly Hearth.)

bad, it produces huge amounts of black carbon, which not only will permanently reduce a child's ability to breathe normally, but cause global warming as well.

Still want the charm of an open fire? Convert to natural gas or propane. It wastes money, anyway but at least it's cleaner.

Need to heat with wood for some reason anyway? Install a pellet stove or a fireplace insert.



Figure 3 Deciduous vines, such as this clematis, planted along south and west facing walls will provide shade in summer but let light through in winter.

Traditional pot-bellied stoves, like the fireplaces, should be a thing of the past. They waste 75 percent of their heat and, like fireplaces, emit prodigious amounts of soot, or black carbon. Replacing them with a modern version, whether fueled by pellets or cord wood, cuts soot pollution up to 96 percent and triples efficiency, requiring less fuel. They can be sized to heat a family room, a small cottage, or a full-sized home.⁵

Replace furnace filters so the air can move easily. If they're affordable, use pleated

microfilters of the sort endorsed by the American Lung Association, because they will trap black carbon and other fine particles. Your children will be much healthier.

Plant trees so they will shade the house, especially the roof. On west and south walls, plant deciduous vines. Because they lose their leaves in the winter, they will provide shade in summer but let light through in winter.

Install ceiling fans: They will make you cooler in summer, warmer in winter.

LIGHTING

Every light bulb must be a florescent. (OK, leave some incandescent bulbs in chandeliers and other places

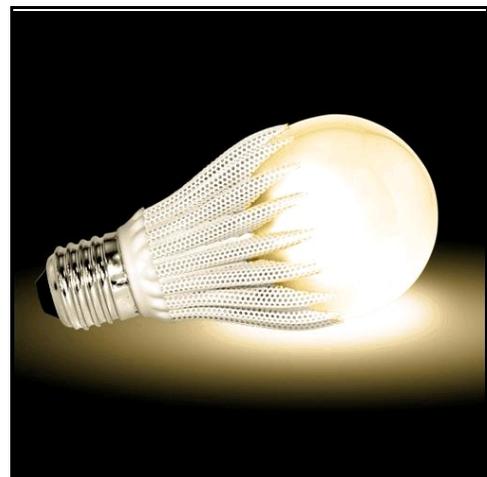


Figure 4 Light bulbs that use light emitting diodes—those tiny lights in the front of a TV or video player—are the wave of the future. They will last for as long as 15 years in normal use, and reduce electricity consumption from, for example, 30 watts to 0.7 watts. (Source: Crane, Inc.)

that are infrequently used.) Circle fluorescents are getting harder to find, but they are instant on, provide better color and last longer.

Soon, bulbs made from light emitting diodes, or LEDs, will become available. Let the fluorescent bulbs burn out before you replace them—and that will take a while. We sold the house in the Outer Banks seven years after rebuilding, and only one compact florescent bulb had been replaced. When you install LED bulbs, they will last for about 15 years of normal use and save immense amounts of electricity.

In rooms where the lights tend to be left on, install occupancy sensors to turn them off.



Figure 5 In some states, one-third of the electricity is used to move water, so reducing consumption also cuts pollution. In the case of a low flow shower head like this, it also saves money for a homeowner, because it reduces the amount of water that has to be heated.

WATER SAVING

In some states, especially California and the rest of the west, up to one third of the electricity is used to move water. Saving water saves kilowatts, which reduces air pollution and global warming. Install low volume and dual flush toilets. The latter uses more water to eliminate solid waste, less for liquid. There's a lot of junk out there, so get a good brand from the outset to avoid a version that ends up being flushed two or three times because it's been poorly designed or built. Toto is terrific, but there several others as well, including a dual flush version sold by Costco. The key is to buy a model that has a finished throat, so it is smooth and doesn't slow

the waste.

Yes, install water saving shower heads, too, as well as aerators on the faucets.

If you're up to it, collect rain water in a cistern and use it for the yard. That avoids using scarce public water that has been filtered and sterilized for the lawn and flowers. For watering, if your state allows it—and a growing number do—use so-called “gray water,” which is from showers, the washing machine and the like, in contrast to “black water” from commodes. Doing that not only avoids using the treated public water, but reduces the volume of waste water that has to be cleansed by the local sewage treatment plant, thus saving you some tax dollars as well.

INSULATION

Insulate everything in sight. Where possible, use rigid foam, because inch-for-inch it's better. Styrofoam is Dow Chemical's brand name, but lots of other versions are out on the

market. Thin super-efficient insulation sometimes called “frozen smoke” is beginning to enter the market place, but is so expensive that its use is restricted to speciality applications like space missions.

MOBILITY AND TRANSPORT

For professional or personal reasons, some people need a vehicle the size of a sport utility vehicle or pickup truck. But let’s get real here: most people don’t. Sport utility vehicles and pickup trucks have been foisted on Americans because they provide, in the words of *The New York Times*, “a spectacular profit margin,” while a company might actually lose money on the sale of a small car.”⁶

Although every vehicle must meet a minimum air pollution standard, some of them go well beyond what’s required. For example, a Toyota Sequoia emits 9 times less pollution than a similarly-sized Lincoln Navigator. These emission numbers, called “certification” data, can be found at the websites of the U.S. Environmental Protection Agency and the California Air Resources Board, if not so easily. Persevere and buy clean.

Drive gently. It will take two to three weeks but soon become a habit, reducing gas consumption by about 5 percent.

Reject any notion of buying a diesel-engined vehicle—and, yes, that includes one that you intend to run on so-called bio-diesel, such as old french fry oil—for fuel economy, thinking that makes it “green.” It is possible to use such used oil as a fuel, and it’s been happening for decades.

To reduce emissions of black carbon, a far more toxic pollutant than carbon dioxide and a much more powerful cause of global warming, cars and trucks are fitted with so-called trap oxidizers, which catch the soot, then burn it. While the soot reductions are very large, emissions remain greater than those of a gasoline-fueled engine. Moreover, the trap reduces fuel economy from to 5 to 8 percent.⁷ Diesel emissions of oxides of nitrogen, a cause of smog, are much higher than gasoline as well, requiring yet another control device, reducing fuel economy further.⁸ To travel truly green, buy a hybrid, such as Toyota’s Prius. Honda and Ford also sell hybrids, but the Prius has the best mileage.

THINGS YOU BUY

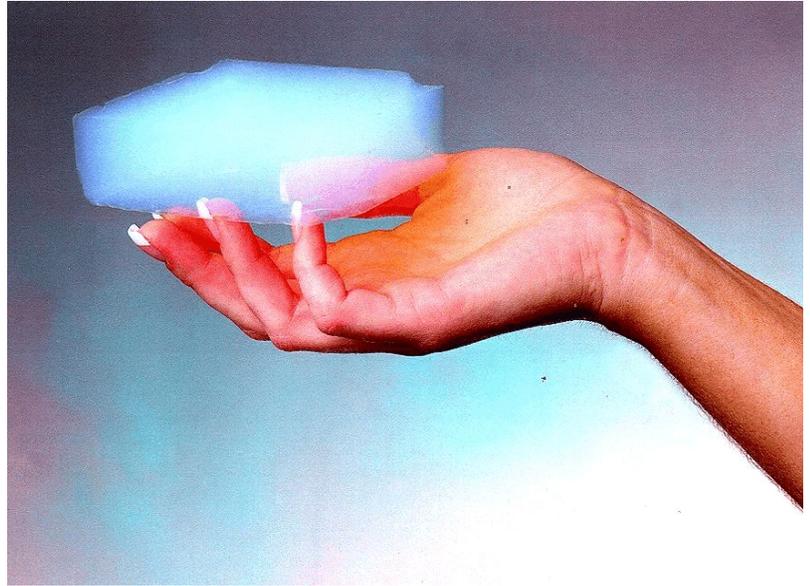


Figure 6 Aerogel, sometimes called “frozen smoke,” is a gel in which the liquid is replaced with gas, creating an extremely low-density solid with about 15 times the insulating value of conventional versions. It is extremely expensive, but with time, price is likely to decline. (Source: NASA.)

Buy locally or do without. Is it really necessary to eat pears from Chile and fish from China? Shipping these goods thousands of miles creates prodigious amounts of pollution and robs local growers of income. It is a mystery why people who buy only American when it comes to cars, refuse to do the same when it comes to food and tennis shoes.

If you need appliances, buy refrigerators, washers, dryers and everything else that meets minimum standards required to get an EPA label. Energy Star is the most common label, but there are others: for example WaterSense for water conservation and Climate Leaders for global warming.

Labels are now on major appliances, office equipment, lighting products, home electronics, and more. In addition, the labels have been extended to cover new homes, some commercial buildings, industrial and farming operations and a wide range of other activities. Forest Stewardship Council (FSC) certification, for example, tells consumers wood products come from sustainable silviculture.

Never buy less than the Energy Star or its equivalent. But don't stop there. Look beyond the label and search out the best, most efficient option. Look, for example, for the the bright yellow EnergyGuide labels required by the U.S. Department of Energy (DOE), which display an appliance's estimated energy consumption and estimated annual operating costs. It's on all new appliances that have a fairly wide range of energy efficiencies between models, including refrigerators, freezers, water heaters, dishwashers, clothes washers, central air conditioners, heat pumps, furnaces and boilers.

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Is there an old refrigerator humming in your basement or garage? Junk it. If it is a 1992 or older model, it's costing you up to \$200 a year in electricity.⁹ If you absolutely must have extra cooling space, search out a newer model, higher efficiency refrigerator.

Finally, a pet peeve: those cans of compressed gas used to clean computer keyboards and a variety of other equipment. Some are filled with compressed air and some with carbon dioxide. But most contain either Freon 134a or HFC-152a. Both cause global warming, but global warming potential, or GWP, of Freon-134a is 1400 while of HFC-152a is 140, or 90 percent less. In short, Freon 134a is a 3,300 times more powerful cause of global warming than carbon dioxide, so a 10-ounce can is roughly equivalent to burning 100 gallons of gasoline.

Neither 134a nor 152 a should be on the market. Use a tiny vacuum, turn the keyboard upside down or clean it with compressed air. But do not, under any circumstances, buy a can filled with Freon-134a.¹⁰

Many, many books describe in greater detail the myriad measures that an individual can take to lessen air pollution and reverse global warming. It is heartening that people are awaking to the grave and imminent threats of air pollution generally and global warming in particular. But beware of strategies calculated to subtly shift the burden of action to the victims of air pollution and global warming and deflect attention from polluting companies. A favorite tactic of



Figure 7 Buy only products that are as good as or better than those bearing the Energy Star label. (Source: U.S. EPA.)

corporations is to blame victims for injuries. Companies that practice this include Alcoa, American Electric Power, Chevron, Duke Power, DuPont, ExxonMobil, General Motors and the Southern Company.

A consumer can and should engage in self help. One of the best ways of doing that, however, is with voting power, not just buying power.

Resources

EPA Energy Star program, <http://www.energystar.gov/>

U.S. DOE Energy Efficiency and Renewable Energy (EERE) Home Page,
<http://www.eere.energy.gov/>

California Energy Commission
<http://www.energy.ca.gov/research/index.html>

American Council for an Energy-Efficient Economy
<http://www.aceee.org/>

Buyer's Guide to Cleaner Cars
<http://www.driveclean.ca.gov>

Home Energy Saver, Lawrence Berkeley National Laboratory <http://hes.lbl.gov>

Efficient appliances, Public Broadcasting Services <http://www.pbs.org/wgbh/warming/carbon>

Energuide (Canada)
<http://energuide.nrcan.gc.ca>

Canada's Office of Energy Efficiency
<http://www.oee.nrcan.gc.ca>

Northwest Earth Institute
<http://www.nwei.org>

The Heat is Online
<http://www.heatisonline.org>

Climate Solutions
<http://www.climatesolutions.org>

Union of Concerned Scientists
<http://www.ucsusa.org>

Alliance to Save Energy
<http://www.ase.org>

Business Council for Sustainable Energy
<http://www.bcse.org>

Stormy Weather: 101 Solutions to Climate Change
<http://www.earthfuture.com/stormyweather>

1. Jennifer Lee, "A Call for Softer, Greener Language," *The New York Times*, March 2, 2003.
2. Parker, D.S. et. al. Measured Cooling Energy Savings From Reflective Roofing Systems In Florida: Field And Laboratory Research Results. Florida Solar Energy Center (FSEC), FSEC-PF-293-95.
A series of field experiments in Florida examined the impact of reflective roof coatings on air conditioning energy use in occupied homes. The tests were conducted on nine residential buildings from 1991 to 1994 using a before and after protocol where the roofs were whitened at mid-summer. Measured AC electrical savings in the buildings during similar pre- and post-retrofit periods averaged 19%, ranging from a low of 2% to a high of 43%. Utility peak coincident peak savings averaged 22%. Cooling energy reductions appear to depend on ceiling insulation level and roof solar reflectance, air duct system location and air conditioner sizing relative to load. A complementary thermal study of the effect of reflective roofing systems conducted in a side-by-side roof test facility. Ceiling heat flux reductions up to (60%) were measured from reflective roofing in these experiments. However, the test results have also shown degradation in solar reflectance and associated thermal performance after a year of exposure.
3. Parker, D.S. et. al. Comparative Evaluation of the Impact of Roofing Systems on Residential Cooling Energy Demand in Florida
Roof and attic thermal performance exert a powerful influence on cooling energy use in Florida homes. The Florida Power and Light Company and the Florida Solar Energy Center instrumented six side-by-side Habitat homes in Ft. Myers, Florida with identical floor plans and orientation, R-19 ceiling insulation, but with different roofing systems designed to reduce attic heat gain. A seventh house had an unvented attic with insulation on the underside of the roof deck rather than the ceiling. These were: (RGS) Standard dark shingles (control home); (RWB) White "Barrel" S-tile roof; (RWS) Light colored shingles; (RWF) White flat tile roof; (RTB) Terra cotta S-tile roof; (RWM) White metal roof; (RSL) Standard dark shingles with sealed attic and R-19 roof deck insulation
4. U.S. Department of Energy, Energy Efficiency and Renewable Energy, "The Economics of a Solar Water Heater," http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12860
5. <http://www.epa.gov/woodstoves/basic.html>

The traditional pot-bellied stove is a thing of the past - today's wood stove models feature improved safety and efficiency. They produce almost no smoke, minimal ash, and require less firewood, They can be sized to heat a family room, a small cottage, or a full-sized home. The best choices are appliances labeled by the Underwriters' Laboratories of Canada (ULC) or another testing and certification body for safety. They should also be certified to be low-emission according to EPA standards. While older uncertified stoves and fireplaces release 40 to 60 grams of smoke per hour; new EPA-certified stoves produce only 2 to 5 grams of smoke per hour. For technical details on wood stoves, see Technical Information.

EPA certified wood stoves burn more cleanly and efficiently, save you money, reduce the risk of fire, and improve air quality inside and outside your home. Check the current list of EPA-certified wood stoves (PDF). (111 pp, 2.0 MB)

EPA certified wood stoves come in different sizes:

- * Small stoves are suitable for heating a family room or a seasonal cottage. For larger homes with older central furnaces, consider "zone heating" a specific area of your home (family or living room) with a small stove. This can reduce fuel consumption, conserve energy and save you dollars while maintaining comfort.
- * Medium stoves are suitable for heating small houses, medium-sized energy-efficient houses, and cottages used in winter.
- * Large stoves are suitable for larger, open plan houses or older, leakier houses in colder climate zones.

Talk with experienced wood stove retailers who know the performance characteristics of the products they sell. When visiting local retailers, take along a floor plan of your home. Knowledgeable retailers can help you find a wood stove that is well suited to the space you want to heat.

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Pellet Stoves

Instead of logs, pellet stoves burn a renewable fuel made of ground, dried wood and other biomass wastes compressed into pellets. They are some of the cleanest-burning heating appliances available today and deliver high overall efficiency. Because they pollute so little, pellet stoves do not require EPA certification; some manufacturers, however, voluntarily seek this certification. Unlike wood stoves and fireplaces, most pellet stoves need electricity to operate, and can be easily vented through a wall, unlike log-burning stoves. For more technical details on pellet stoves, see Don Vandervort's hometips.com. Exit EPA disclaimer

Gas Stoves

Gas stoves are designed to burn either natural gas or propane. They emit very little pollution, require little maintenance, and can be installed almost anywhere in the home. Today's gas stoves feature large, dancing yellow flames and glowing red embers that are nearly identical in appearance to a wood fire. They can be vented through an existing chimney, or direct vented through the wall behind the stove. While some models do not require outside venting, EPA does not support their use due to indoor air quality concerns. For more information, see the [Hearth, Patio, and Barbecue Association Fact Sheet on Gas Stoves \(PDF\)](#). Exit EPA disclaimer (2 pp, 1.2 MB)

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Fireplace Inserts

If you rely on your fireplace for added warmth on cold days, consider a fireplace insert. They are similar in function and performance to free-standing stoves, but are designed to be installed within the firebox of an existing masonry or metal fireplace. Municipal installation codes now require that a properly sized stainless-steel liner be installed from the insert flue collar to the top of the chimney. The result is better performance and a safer system. You can choose from inserts that burn wood, pellets, or gas that provide the same safe efficiency as their stove counterparts. EPA certified wood and pellet burning inserts are available. Some fireplace inserts include state-of-the-art features such as fans and thermostatic controls (depending on the fuel). For more information, see [More Efficient, Cleaner Burning Fireplaces](#).

Decorative Fireplace Gas Logs

If you have an existing fireplace but seldom use it – or use it more for aesthetics than heating, you may want to consider installing a set of decorative gas logs. While not designed to be a significant source of heat, decorative logs provide dramatic realism, from the lifelike ceramic fiber, concrete or refractory logs down to the glowing embers. Because they burn either natural gas or propane, they also have low emissions. For more information see the [Hearth, Patio, and Barbecue Association Fact Sheet on Gas Logs \(PDF\)](#). Exit EPA disclaimer (2 pp, 1.5 MB)

Masonry Heaters

Many Americans are not familiar with masonry heaters, but versions of these wood-burning devices have been used in Europe for centuries. A masonry heater is a site-built or site-assembled solid-fueled heating device, consisting of a firebox, a large masonry mass, and a maze of heat exchange channels. While it may look like a fireplace, a masonry heater works differently. It stores heat from rapidly-burning fires within its masonry structure, and slowly releases the heat into the home throughout the day. Masonry heaters currently do not require EPA certification; however, since their fires are small and burn hot, they produce far less smoke than a fireplace or non-certified wood stove - yet the heater's surface remains cool to the touch. The [Masonry Heater Association of North America](#) Exit EPA disclaimer can provide you with more information on masonry heaters and installers near your area.

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Burn Cleaner, Save Money and Energy

Cleaner burning hearth devices can reduce your energy bill, in addition to protecting your health. The [Hearth, Patio, and Barbecue Association](#) has developed a cost-effectiveness calculator (<http://www.hpba.org/hpba1/effcalc.cfm>) Exit EPA disclaimer to show how various cleaner-burning stoves and fireplace inserts can actually save you money (Note: EPA cannot support the use of non-vented gas stoves or fireplace inserts due to indoor air quality concerns). You can compare the cost of heating your home with wood, electricity, natural gas, oil, or coal. You can also see how using a cleaner burning hearth device to supplement your existing heating system can reduce your overall home heating cost.

[Finding the Right Size and Model—Talk to a Professional](#)

Wood stoves come in different sizes:

* Small stoves are suitable for heating a family room or a seasonal cottage. In larger homes with older central furnaces, you can use a small stove for "zone heating" a specific area of your home (family or living room). This can reduce fuel consumption, conserve energy and save you dollars while maintaining comfort.

* Medium stoves are suitable for heating small houses, medium-sized energy-efficient houses, and cottages used in winter.

* Large stoves are suitable for larger, open plan houses or older, leakier houses in colder climate zones.

In addition, fireplace inserts also come in various sizes.

Talk with experienced hearth product retailers who know the performance characteristics of the products they sell. When visiting local retailers, take along a floor plan of your home. Knowledgeable retailers can help you find a wood stove, fireplace insert, or other hearth product that is well suited to the space you want to heat.

To find retailers of EPA certified wood stoves, fireplace inserts, and other hearth products near you, use The Hearth, Patio and Barbecue Association store locator [Exit EPA disclaimer](#) or consult the Yellow Pages.

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7. Jacobson, M.Z. Control of fossil-fuel particulate black carbon and organic matter, possibly the most effective method of slowing global warming. *JOURNAL OF GEOPHYSICAL RESEARCH*, VOL. 107, NO. D19, 4410, doi:10.1029/2001JD001376, 2002.

8. Jacobson, M.Z. et. al. The effect on photochemical smog of converting the U.S. fleet of gasoline vehicles to modern diesel vehicles, *Geophys. Res. Lett.*, 31, L02116, doi:10.1029/2003GL018448, 2004.

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