The background image shows a hand at the top left pouring a \$20 bill and several coins into a house. The house has solar panels on its roof and a red door. A person is standing in the yard. The entire scene is framed by a green border.

ENERGY SAVERS

BOOKLET

Tips for Saving
Energy and Money
at Home



U.S. DEPARTMENT OF
ENERGY

Special REALTOR® Edition!

Because REALTORS® care:

As energy prices increase, it makes sense to consider the energy efficiency of your home. If you are worried about energy costs, you're not alone. Nearly half of all REALTORS®, members of the National Association of REALTORS®, say this is an important issue for their clients and 87% say that their clients' concerns over home energy efficiency will increase over the next year.

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This booklet shows you how easy it is to reduce your energy use at home and on the road. The easy, practical solutions for saving energy include tips you can use today, throughout your home—from the roof, walls, and insulation that enclose it to the appliances and lights inside. Please take a few moments to read the valuable tips in this booklet to start saving energy and money today.

To learn more about U.S. Department of Energy programs in energy efficiency and renewable energy, visit the Office of Energy Efficiency and Renewable Energy's web site at www.eere.energy.gov

Save Energy and Money Today

Did you know that the typical U.S. family spends about \$1,900 a year on home utility bills? Unfortunately, a large portion of that energy is wasted. And each year, electricity generated by fossil fuels for a single home puts more carbon dioxide into the air than two average cars. And as for the road, transportation accounts for 67% of all U.S. oil consumption. The good news is that there is a lot you can do to save energy and money at home and in your car. Start making small changes today (see sidebar). To cut your energy use up to 25%, see the Long-Term Savings Tips throughout this booklet.

The key to achieving these savings in your home is a whole-house energy efficiency plan. To take a whole-house approach, view your home as an energy system with interdependent parts. For example, your heating system is not just a furnace—it's a heat-delivery system that starts at the furnace and delivers heat throughout your home using a network of ducts. Even a top-of-the-line, energy-efficient furnace will waste a lot of fuel if the ducts, walls, attic, windows, and doors are not properly sealed and insulated. Taking a whole-house approach to saving energy ensures that dollars you invest to save energy are spent wisely.

Energy-efficient improvements not only make your home more comfortable, they can yield long-term financial rewards. Reduced utility bills more than make up for the higher price of energy-efficient appliances and improvements over their lifetimes. In addition, your home could bring in a higher price when you sell.

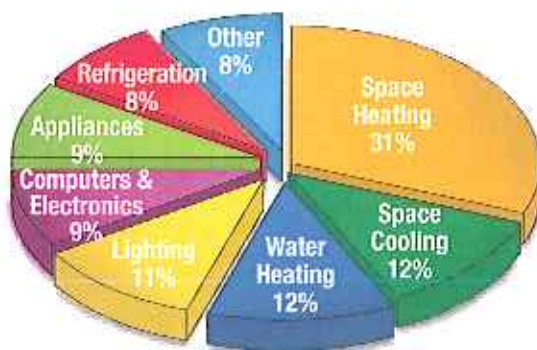
Tips to Save Energy Today

Easy low-cost and no-cost ways to save energy.

- Install a programmable thermostat to keep your house comfortably warm in the winter and comfortably cool in the summer.
- Use compact fluorescent light bulbs with the ENERGY STAR® label.
- Air dry dishes instead of using your dishwasher's drying cycle.
- Turn off your computer and monitor when not in use.
- Plug home electronics, such as TVs and DVD players, into power strips; turn the power strips off when the equipment is not in use (TVs and DVDs in standby mode still use several watts of power).
- Lower the thermostat on your hot water heater to 120°F.
- Take short showers instead of baths.
- Wash only full loads of dishes and clothes.
- Drive sensibly. Aggressive driving (speeding, rapid acceleration and braking) wastes gasoline.
- Look for the ENERGY STAR label on home appliances and products. ENERGY STAR products meet strict efficiency guidelines set by the U.S. Department of Energy and the Environmental Protection Agency.
- Visit www.energysavers.gov for more energy-saving ideas.

Your Home's Energy Use

The first step to taking a whole-house energy efficiency approach is to find out which parts of your house use the most energy. A home energy audit will pinpoint those areas and suggest the most effective measures for cutting your energy costs. You can conduct a simple home energy audit yourself, contact your local utility, or call an independent energy auditor for a more comprehensive examination. For more information about home energy audits, including free tools and calculators, visit www.energysavers.gov or www.natresnet.org.



How We Use Energy in Our Homes

Heating accounts for the biggest chunk of a typical utility bill.

Source: 2007 Buildings Energy Data Book, Table 4.2.1., 2005 energy cost data.

Energy Auditing Tips

- Check the insulation levels in your attic, exterior and basement walls, ceilings, floors, and crawl spaces. Visit www.energysavers.gov for instructions on checking your insulation levels.
- Check for holes or cracks around your walls, ceilings, windows, doors, light and plumbing fixtures, switches, and electrical outlets that can leak air into or out of your home.

- Check for open fireplace dampers.
- Make sure your appliances and heating and cooling systems are properly maintained. Check your owner's manuals for the recommended maintenance.
- Study your family's lighting needs and use patterns, paying special attention to high-use areas such as the living room, kitchen, and outside lighting. Look for ways to use lighting controls—like occupancy sensors, dimmers, or timers—to reduce lighting energy use, and replace standard (incandescent) light bulbs and fixtures with compact or standard fluorescent lamps.

Formulating Your Plan

After you have identified where your home is losing energy, assign priorities by asking yourself a few important questions:

- How much money do you spend on energy?
- Where are your greatest energy losses?
- How long will it take for an investment in energy efficiency to pay for itself in energy cost savings?
- Do the energy-saving measures provide additional benefits that are important to you (for example, increased comfort from installing double-paned, efficient windows)?
- How long do you plan to own your current home?
- Can you do the job yourself or will you need to hire a contractor?
- What is your budget and how much time do you have to spend on maintenance and repair?

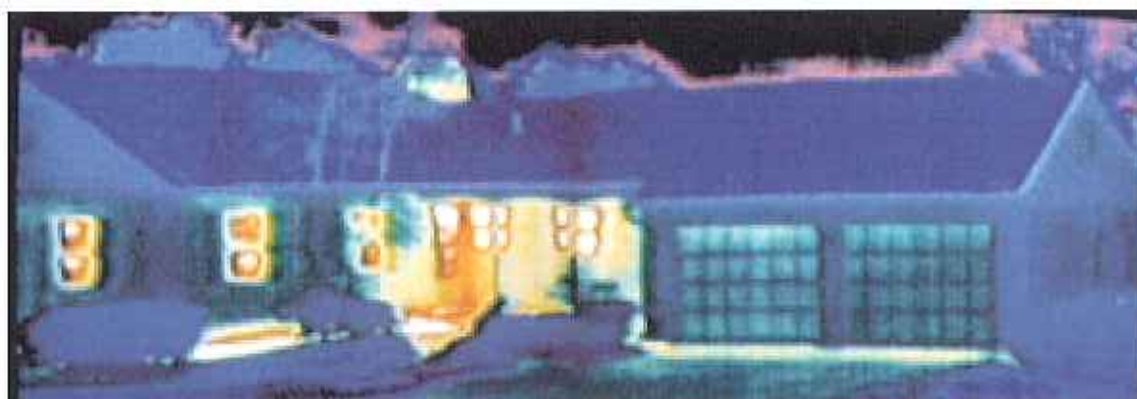
Once you assign priorities to your energy needs, you can form a whole house efficiency plan. Your plan will provide you with a strategy for making smart purchases and home improvements that maximize energy efficiency and save the most money.

Another option is to get the advice of a professional. Many utilities conduct energy audits for free or for a small charge. For a fee, a professional contractor will analyze how well your home's energy systems work together and compare the analysis to your utility bills. He or she will use a variety of equipment such as blower doors, infrared cameras, and surface thermometers to find leaks and drafts. After gathering information about your home, the contractor or auditor will give you a list of recommendations for cost-

Tips for Finding a Contractor

- Ask neighbors and friends for recommendations
- Look in the Yellow Pages
- Focus on local companies
- Look for licensed, insured contractors
- Get three bids with details in writing
- Ask about previous experience
- Check references
- Check with the Better Business Bureau

effective energy improvements and enhanced comfort and safety. A reputable contractor can also calculate the return on your investment in high-efficiency equipment compared with standard equipment.



Cool  Hot

Heat Loss from a House

A picture is worth...in this case, lost heating dollars. This thermal photograph shows heat leaking from a house during those expensive winter heating months. The white, yellow, and red colors show heat escaping. The red represents the area of the greatest heat loss.

Thermogram photograph copyright 1997, Infrared Institute, Inc., Shelburne, VT

Insulation and Sealing Air Leaks

Checking your home's insulation is one of the fastest and most cost-effective ways to use a whole-house approach to reduce energy waste and make the most of your energy dollars. A good insulating system includes a combination of products and construction techniques that protect a home from outside hot or cold temperatures, protect it against air leaks, and control moisture. You can increase the comfort of your home while reducing your heating and cooling needs by investing in proper insulation and sealing air leaks.

Insulation

First, check the insulation in your attic, ceilings, exterior and basement walls, floors, and crawl spaces to see if it meets the levels recommended for your area. Insulation is measured in R-values—the higher the R-value, the better your walls and roof will resist the transfer of heat. DOE recommends ranges of R-values based on local heating and cooling costs and climate conditions in different areas of the nation. The map and chart on pages 6 and 7 show the DOE recommendations for your area. State and local code minimum insulation requirements may be less than the DOE recommendations, which are based on



Where to Insulate

Adding insulation in the areas shown above may be the best way to improve your home's energy efficiency. Insulate either the attic floor or under the roof. Check with a contractor about crawl space or basement insulation.

cost effectiveness. For more customized insulation recommendations, visit our site, www.energysavers.gov, look for Insulation and check out the Zip Code Insulation Calculator. This tool provides insulation levels for your new or existing home based on your zip code and other basic information about your home. Although insulation can be made from a variety of materials, it usually comes in four types; each type has different characteristics.

Rolls and batts—or blankets—are flexible products made from mineral fibers, such as fiberglass and rock wool.

They are available in widths suited to standard spacings of wall studs and attic or floor joists: 2x4 walls can hold R-13 or R-15 batts; 2x6 walls can have R-19 or R-21 products.

Loose-fill insulation—usually made of fiberglass, rock wool, or cellulose in the form of loose fibers or fiber pellets, it should be blown into spaces using special pneumatic equipment. The blown-in material conforms readily to building cavities and attics. Therefore, loose-fill insulation is well suited for places where it is difficult to install other types of insulation.

Rigid foam insulation—foam insulation typically is more expensive than fiber insulation. But it's very effective in buildings with space limitations and where higher R-values are needed. Foam insulation R-values range from R-4 to R-6.5 per inch of thickness, which is up to 2 times greater than most other insulating materials of the same thickness.

Foam-in-place insulation—this type can be blown into walls and reduces air leakage, if blown into cracks, such as around window and door frames.

Should I Insulate My Home?

Insulate your home when:

- You have an older home and haven't added insulation. Only 20% of homes built before 1980 are well insulated.
- You are uncomfortably cold in the winter or hot in the summer—adding insulation creates a more uniform temperature and increases comfort.
- You build a new home, addition, or install new siding or roofing.
- You pay high energy bills.
- You are bothered by noise from outside—insulation muffles sound.

Insulation Tips

- Consider factors such as your climate, building design, and budget when selecting insulation R-values for your home.
- Use higher density insulation on exterior walls, such as rigid foam boards, in cathedral ceilings and on exterior walls.
- Ventilation helps with moisture control and reducing summer cooling bills. Attic vents can be installed along the entire ceiling cavity to help ensure proper airflow from the soffit to the attic to make a home more comfortable and energy efficient. Do not ventilate your attic if you have insulation on the underside of the roof. Check with a qualified contractor.
- Recessed light fixtures can be a major source of heat loss, but you need to be careful how close you place insulation next to a fixture unless it is marked IC—designed for direct insulation contact. Check your local building codes for recommendations. See Lighting for more about recessed cans.

- As specified on the product packaging, follow the product instructions on installation and wear the proper protective gear when installing insulation.

\$ Long-Term Savings Tip

- One of the most cost-effective ways to make your home more comfortable year-round is to add insulation to your attic.

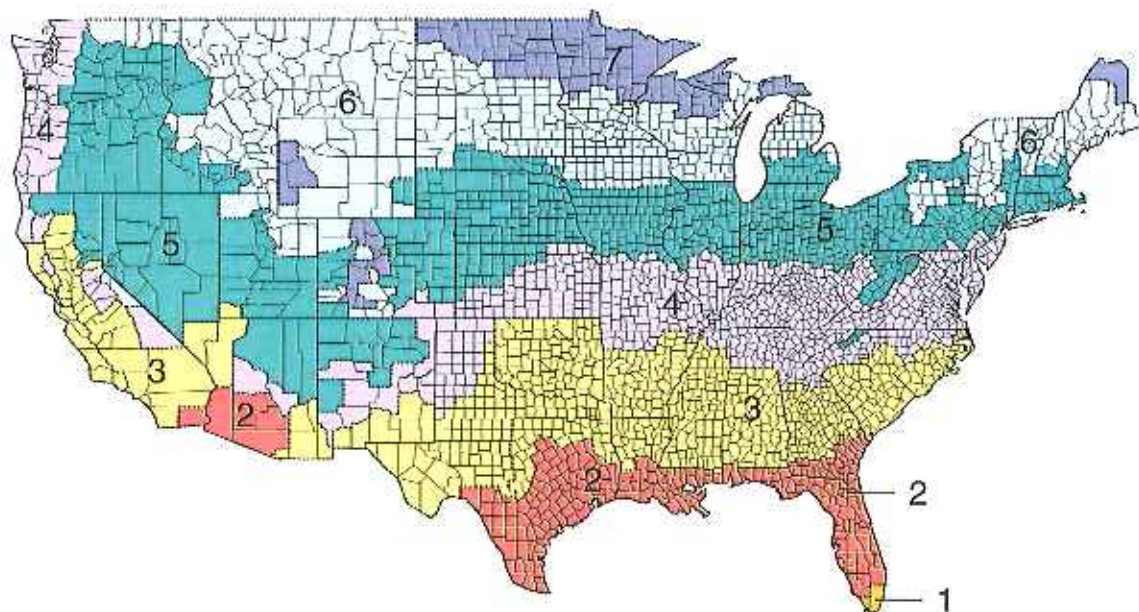
Adding insulation to the attic is relatively easy and very cost effective. To find out if you have enough attic insulation, measure the thickness of the insulation. If it is less than R-30 (11 inches of fiber glass or rock wool or 8 inches of cellulose), you could

probably benefit by adding more. Most U.S. homes should have between R-30 and R-60 insulation in the attic. Don't forget the attic trap or access door.

If your attic has enough insulation and your home still feels drafty and cold in the winter or too warm in the summer, chances are you need to add insulation to the exterior walls as well. This is a more expensive measure that usually requires a contractor, but it may be worth the cost if you live in a very hot or cold climate. If you replace the exterior siding on your home, you should consider adding insulation at the same time.

You may also need to add insulation to your crawl space or basement. Check with a professional contractor.

U.S. Department of Energy Recommended* Total R-Values for New Wood-Framed Houses



All of Alaska in Zone 7 except for the following boroughs in Zone 8:

Bethel	Northwest Arctic
Dillingham	Southeast Fairbanks
Fairbanks N. Star	Wade Hampton
Nome	Yukon-Koyukuk
North Slope	

Zone 1 includes Hawaii, Guam, Puerto Rico and the Virgin Islands

How Much Insulation Does My Home Need?

For insulation recommendations tailored to your home, visit the DOE Zip Code Insulation Calculator at www.ornl.gov/~roots/zip/ziphome.html.

* These recommendations are cost-effective levels of insulation based on the best available information on local fuel and materials costs and weather conditions. Consequently, the levels may differ from current local building codes.

New Construction

For new homes in most climates, you will save money and energy if you install a combination of cavity insulation and insulative sheathing. Cavity insulation can be installed at levels up to R-15 in a 2 in. x 4 in. wall and up to R-21 in a 2 in. x 6 in. wall. The insulative sheathing, used in addition to this cavity insulation, helps to reduce the energy that would otherwise be lost through the wood frame. The table below shows the recommended combinations. For example, in Zone 5, you could use either a 2x4 wall with R-13 or a 2x6 wall with R-21. For either of those two walls, you should also use an inch of insulative sheathing that has an R-value of R-5 or R-6.

Today, new products are on the market that provide both insulation and structural support and should be considered for new home construction or additions. Structural insulated panels, known as SIPs, and masonry products like insulating concrete forms are among these. Some homebuilders are even using an old technique borrowed from the pioneers: building walls using straw bales. Check online at www.energysavers.gov for more information on structural insulation.

Radiant barriers (in hot climates), reflective insulation, and foundation insulation should all be considered for new home construction. Check with your contractor for more information about these options.

Zone	Gas	Heat Pump	Fuel Oil	Electric Furnace	Attic	Cathedral Ceiling	Wall		Floor
							Cavity	Insulation Sheathing	
1	✓	✓	✓	✓	R30 to R49	R22 to R38	R13 to R15	None	R13
2	✓	✓	✓		R30 to R60	R22 to R38	R13 to R15	None	R13
2				✓	R30 to R60	R22 to R38	R13 to R15	None	R19 - R25
3	✓	✓	✓		R30 to R60	R22 to R38	R13 to R15	None	R25
3				✓	R30 to R60	R22 to R38	R13 to R15	R2.5 to R5	R25
4	✓	✓	✓		R38 to R60	R30 to R38	R13 to R15	R2.5 to R6	R25 - R30
4				✓	R38 to R60	R30 to R38	R13 to R15	R5 to R6	R25 - R30
5	✓	✓	✓		R38 to R60	R30 to R38	R13 to R15	R2.5 to R6	R25 - R30
5				✓	R38 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30
6	✓	✓	✓	✓	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30
7	✓	✓	✓	✓	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30
8	✓	✓	✓	✓	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30



Sources of Air Leaks in Your Home

Areas that leak air into and out of your home cost you lots of money. Check the areas listed below.

- | | | |
|--------------------------|----------------------------------|---|
| 1 Dropped ceiling | 5 Water and furnace flues | 9 Window frames |
| 2 Recessed light | 6 All ducts | 10 Electrical outlets and switches |
| 3 Attic entrance | 7 Door frames | 11 Plumbing and utility access |
| 4 Sill plates | 8 Chimney flashing | |

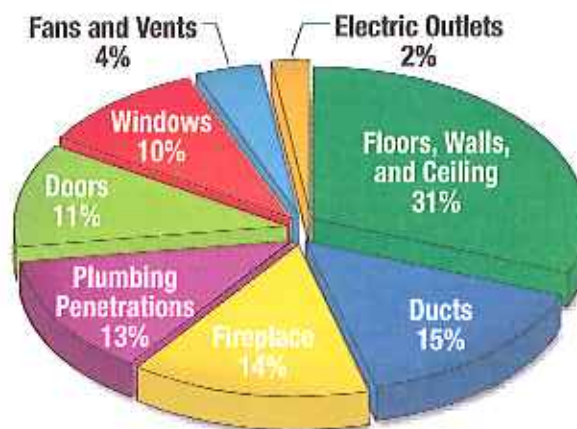
Sealing Air Leaks

Warm air leaking into your home during the summer and out of your home during the winter can waste a lot of your energy dollars. One of the quickest dollar-saving tasks you can do is caulk, seal, and weatherstrip all seams, cracks, and openings to the outside. You can save on your heating and cooling bill by reducing the air leaks in your home.

Tips for Sealing Air Leaks

- First, test your home for air tightness. On a windy day, carefully hold a lit incense stick or a smoke pen next to your windows, doors, electrical boxes, plumbing fixtures, electrical outlets, ceiling fixtures, attic hatches, and other locations where there is a possible air path to the outside. If the smoke stream travels horizontally, you have located an air leak that may need caulking, sealing, or weatherstripping.

- Caulk and weatherstrip doors and windows that leak air.
- Caulk and seal air leaks where plumbing, ducting, or electrical wiring penetrates through walls, floors, ceilings, and soffits over cabinets.
- Install foam gaskets behind outlet and switch plates on walls.
- Look for dirty spots in your insulation, which often indicate holes where air leaks into and out of your house. You can seal the holes with low-expansion spray foam made for this purpose.
- Look for dirty spots on your ceiling paint and carpet, which may indicate air leaks at interior wall/ceiling joints and wall/floor joists. These joints can be caulked.
- Install storm windows over single-pane windows or replace them with more efficient windows, such as double-pane. See Windows on page 18 for more information.
- When the fireplace is not in use, keep the flue damper tightly closed. A chimney is designed specifically for smoke to escape, so until you close it, warm air escapes—24 hours a day!
- For new construction, reduce exterior wall leaks by installing house wrap, taping the joints of exterior sheathing, and comprehensively caulking and sealing the exterior walls.
- Use foam sealant around larger gaps around windows, baseboards, and other places where warm air may be leaking out.
- Kitchen exhaust fan covers can keep air from leaking in when the exhaust fan is not in use. The covers typically attach via magnets for ease of replacement.



How Does the Air Escape?

Air infiltrates into and out of your home through every hole and crack. About one-third of this air infiltrates through openings in your ceilings, walls, and floors.

- Replacing existing door bottoms and thresholds with ones that have pliable sealing gaskets is a great way to eliminate conditioned air leaking out from underneath the doors.
- Fireplace flues are made from metal, and over time repeated heating and cooling can cause the metal to warp or break, creating a channel for hot or cold air loss. Inflatable chimney balloons are designed to fit beneath your fireplace flue during periods of non-use. They are made from several layers of durable plastic and can be removed easily and reused hundreds of times. Should you forget to remove the balloon before making a fire, the balloon will automatically deflate within seconds of coming into contact with heat.

Heating and Cooling

Heating and cooling your home uses more energy and drains more energy dollars than any other system in your home. Typically, 46% of your utility bill goes for heating and cooling. What's more, heating and cooling systems in the United States together emit 150 million tons of carbon dioxide into the atmosphere each year, adding to global climate change. They also generate about 12% of the nation's sulfur dioxide and 4% of the nitrogen oxides, the chief ingredients in acid rain.

No matter what kind of heating, ventilation, and air-conditioning system you have in your house, you can save money and increase your comfort by properly maintaining and upgrading your equipment. But remember, an energy-efficient furnace alone will not have as great an impact on your energy bills as using the whole-house approach. By combining proper equipment maintenance and upgrades with appropriate insulation, air sealing, and thermostat settings, you can cut your energy use for heating and cooling, and reduce environmental emissions, from 20% to 50%.

Heating and Cooling Tips

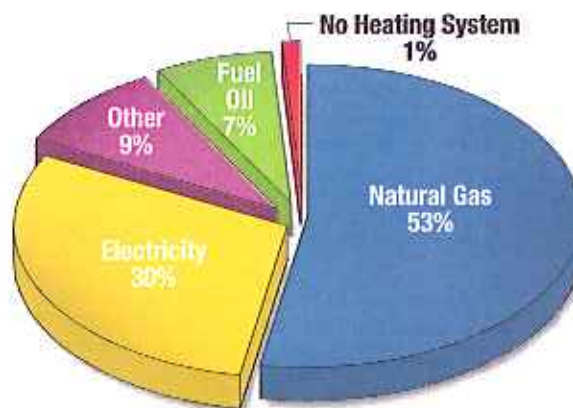
- Set your thermostat as low as is comfortable in the winter and as high as is comfortable in the summer.
- Clean or replace filters on furnaces once a month or as needed.
- Clean warm-air registers, baseboard heaters, and radiators as needed; make sure they're not blocked by furniture, carpeting, or drapes.
- Bleed trapped air from hot-water radiators once or twice a season;

if in doubt about how to perform this task, call a professional.

- Place heat-resistant radiator reflectors between exterior walls and the radiators.
- Turn off kitchen, bath, and other exhaust fans within 20 minutes after you are done cooking or bathing; when replacing exhaust fans, consider installing high-efficiency, low-noise models.
- During the heating season, keep the draperies and shades on your south-facing windows open during the day to allow the sunlight to enter your home and closed at night to reduce the chill you may feel from cold windows.
- During the cooling season, keep the window coverings closed during the day to prevent solar gain.

\$ Long-Term Savings Tips

- Select energy-efficient products when you buy new heating and cooling equipment. Your contractor should be able to give you energy fact sheets for different types, models, and designs to help you



Household Heating Systems

Although several different types of fuels are available to heat our homes, more than half of us use natural gas.