




Home Helps

Strategies for:

Personal Comfort
Staying Healthy
Saving Money
The Environment



You can
pay less
for utility
expenses
and help the
environment.

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There are an estimated 73 million homes in the United States.

The U.S. EPA estimates these homes currently spend an average of \$1,300 each year on utility bills for heating and cooling and emit over 26,000 pounds of carbon dioxide. These averages are based on the typical home, which is considered to be 2,280 square feet of conditioned floor space. Of course, if your home is larger or smaller, or your home is a multi-family unit and not a single-family home, your usage will be different. These costs could increase if fuel prices increase.

All residences share two things in common: utility bills can be reduced, often up to 30%, and you can be comfortable and help the environment in the process.

While the average single-family residence features annual energy costs of \$0.63 per square foot, this can be reduced to approximately \$0.44 per square foot with some very easy measures. Should you consider some of these measures?

Here are a couple of questions to help you decide.

- First, are you comfortable and healthy in your home?
- Second, are your heating and cooling costs reasonable compared to similar residences?

Based on your answers to these questions, you might want to consider the measures outlined in this brochure, "Home Helps." The pollution prevention branch of the U.S. EPA's regional office located in Kansas City, Kansas, provides some tips. We help people become more comfortable, healthier, save money, and preserve the environment. Throughout this document, we'll use estimates of savings, pollution numbers, and tips that our regional office has identified through sources such as the Rocky Mountain Institute and Kansas Building Science Institute. Of course, the actual savings, pollution avoided and strategies for an individual homeowner vary according to the exact conditions of a particular home. What we'll cover generally applies to all Region 7 homeowners, while variability does not guarantee specific results in unique conditions.



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Are you comfortable and healthy?

The role of humidity is vital to both comfort and health. To stay comfortable in the winter often means increasing humidity where you live. This is because humid air makes you feel warmer since humid air holds more moisture.

But the opposite is true in summer. During the warm season, you'll want to reduce the amount of humidity in your living space to feel cooler. High temperatures and high humidity inhibit your body's evaporation rate, which is what feels "clammy" about high humidity conditions.

The ideal levels of humidity for your living space will be less than 60% in the summer and between 25 – 40% in the winter. If the percentages are higher than this in the summer, you'll feel too warm. Humid air suppresses evaporation of sweat from the skin, which causes the sticky feeling. High humidity also increases the cooling demands of an air conditioning unit because humid air contains more heat than dry air at the same temperature.



So if you are uncomfortable in either or both seasons or experiencing any health ailments that might be mold related, you'll want to consider your possibilities for increasing your comfort by reading the section "what steps can you take?"

But first, let's consider the question concerning what you currently pay to heat and cool your home to see if it's reasonable compared to other homes of similar size, age and other features.

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Are your utility bills reasonable?

To find out, EPA offers the “Home Energy Yardstick” to analyze your heating and cooling bills and see how your home stacks up against similar sized homes and weather regions.

This is a fun and free software tool located at www.energystar.gov. Once at that site, click on “Improve the efficiency of your home,” and then on the Yardstick.

Before you go to that site, you’ll need to compile a little information. First, you’ll need to know the total amount of square footage in terms of conditioned space where you live. You’ll also need to know the decade when your residence was built. Finally, you’ll need a year’s worth of your monthly heating and cooling bills. If you’ve kept these bills, you might make a hand-written or typewritten summary before you open the “Home Energy Yardstick” program.

The summary you’ll make will indicate the monthly kilowatt and natural gas usage amounts and the cost of each for the past 12 months.

It’s no real problem if you don’t have your old bills on hand. When you receive your next bill, look at the account numbers and call the utility providers and ask for a copy of your previous year’s usage. This might mean you need to wait a little while before using the Yardstick because you won’t be able to use it successfully until you have this and the other information (square footage, decade built) on hand. But once you have that information, you’ll be ready to use the Yardstick.



You should note that if your residence uses natural gas, the Yardstick will ask for the usage amount in terms of CCF, a term for each 100 cubic feet of gas used to heat your residence. Some utilities, like the Kansas Gas Service, provide their usage levels in terms of MCF, which is an abbreviation for each 1,000 cubic feet of natural gas. So, for someone who receives their gas bills in terms of MCF, when using the Yardstick an MCF recipient would answer the CCF question through multiplying by “10.”



You can select the option that outlines the five most effective ways to save money and energy.

In other words, a monthly usage of 1 MCF is 10 CCF (a typical summer usage), or 7 MCF is 70 CCF (a typical winter usage) in regard to completing the CCF usage questions in the software. If your natural gas provider doesn’t portray usage in terms of CCF, you’ll want to convert the data as needed. If you have any questions about this, contact your provider and ask for the conversion factors for translating whatever measurement is used into CCF.

Okay, once you’ve gathered all that information and entered all the information into the Yardstick, you’ll receive a numerical rating from 1 to 10, letting you know how you compare to other residences of a similar size in weather areas similar to the ones associated with your zip code.

Let’s assume your residence scores an 8 on the yardstick. That’s very good, but still leaves some room for improvement if you want to save even more money or ensure the top environmental performance possible for your home.

If you want, you can choose three options on the Yardstick results page to learn about steps you can take. You can select the option that outlines the five most effective ways to save money and energy. You can also see a list of the Energy Management Consultants in your area that would be available for a more specific review of your residence. Thirdly, you can find out about the Energy Star® labeled products available for your home.



Steps you take on your own Staying warm in winter

We'll tackle staying warm first because conditioning space with heat is the largest source of energy consumption in homes, weighing in at 34% of all annual utility usage. These heating needs are the principal contributor to what makes an average home twice the emitter of carbon dioxide emissions as a vehicle. On average, we use five times as much energy to heat space as to cool it, so heating is definitely our first priority to consider when conserving energy.

The challenge with staying warm concerns humidity, as we covered earlier. You will want to limit the indoor humidity of your home to 40% in the winter, though, or your windows will suffer from condensation. Visible moisture may allow microbes to fester that are often associated with respiratory problems. You can find Energy Star® labeled dehumidifiers, and a wide range of other products and appliances, under the "products" section of the website at www.energystar.gov.

Practical tips to help you stay warm each winter:

- Open drapes and shades on sunny days to let in the sun's warmth, but close them at night to retain the heat.
- Move furniture away from heat registers and cold air returns to maximize air flow.
- Put draft stoppers (e.g., a rolled-up towel) at the bottom of outside doorways to keep out cold air.

Windows affect comfort more directly than other building components because of their low thermal resistance and high solar transmittance.

We therefore recommend:

- Fix or tape cracks in windows
- Weather-strip and/or caulk all areas of noticeable leaks around windows and doors
- Install plastic thermal coverings on windows.



Setting the thermostat at 68 degrees while home may be the best balance of staying warm and conserving energy. It's estimated that for each degree you turn down the thermostat, you'll save about 4% in monthly utility expenses.

Next, here's a list of various measures for your home that will help you keep the temperature at 68 degrees and save money in the process. These alternatives describe estimates of how much money you might save on average per year to heat your living space:

Measure:	Saves:
Programmable thermostat	\$ 58.10
Seal large air leaks	\$ 80.76
Insulate water heater	\$ 14.95
Add attic insulation	\$116.20
Seal and insulate ducts	\$ 81.90
Weatherize windows and doors	\$ 33.70
Add basement insulation	\$ 61.88

Besides saving money, adopting these seven measures will avoid an estimated 8,600 pounds per year of carbon dioxide. Some steps, such as lowering the thermostat temperature, cost nothing. Other measures may have some out-of-pocket expense, such as installing a programmable thermostat. That will cost between \$45 – \$125 and pay for itself in an average of two years by reduced energy bills.

But this isn't all you can do to stay warm. In Region 7, we've also identified three largely overlooked strategies that homeowners might consider.

- First, limit fireplaces. Although fireplaces warm you when directly in front of them, wood burning fireplaces let 90% of the generated heat escape through the chimney. That's right: fireplaces are only about 10% efficient and have huge combustion requirements. They use huge amounts of air for which you've already paid to heat your home to fuel their combustive process. As they draw in air in order to combust (about 400 cubic feet per minute), 90% of that air goes up through the chimney. The air sucked into the combustion process then has to be replaced in your home. In other words, as more air is used to combust a fireplace, it creates a vacuum that has to be replaced. So you might wind up paying extra as the amount of air needed to be drawn in and warmed in your overall spaces is increased. Gas logs are pretty much the same. When choosing to use a wood-burning fireplace, be sure to check with county requirements to ensure they are operated within local ordinances that safeguard environmental effects of their use.
- Second, consider electric heaters. They are more energy efficient than fireplaces, only costing about two cents per hour of operation for a 500 watt setting. Using these, you get the same sense of direct heating as with a fireplace but without creating the huge air combustion requirements of a fireplace. If you turn your central system down a few degrees and supplement with an electric heater, you'll save money. If your central system stays at the same temperature and you supplement with an electric heater, you'll spend more money. But either option is more energy efficient than a fireplace. If using an electric heater, be sure to follow the safety precautions, especially if small children or animals are nearby.



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- Third, check the ducts. To ensure that as much warm air as possible is delivered through your central system, check the ductwork and wrap any leaks with duct mastic. Distribution losses (what's lost while air is transported from your furnace through ductwork to the vents) often amounts to 30%. Sealing ductwork could raise efficiency and make your furnace work less, while keeping you warmer!

Try one or as many of these measures as you can and you'll find yourself more comfortable, healthier, saving money and helping preserve the environment. Let's next look at steps to stay cooler in the summer with savings and the environment in mind.

Staying cool in summer

The best humidity level for your indoor environment in the summer is less than 60%. This will prevent condensation on cooler surfaces of an air conditioned home.

Let's talk about central air conditioners and their running time. When air conditioners are frequently running in the summer, people tend to think something must be wrong, that the unit is inefficient and not working properly.

But frequent "cycling" by your air conditioner is a good thing! This is how an air conditioner removes humidity – by the frequent runs – so it is something to welcome, not lament.

In fact, it is standard practice for central air conditioning units to be installed that are 30 – 100% oversized on the assumption that a large unit will "blast" cool air throughout the house. However the opposite is true. Oversized air conditioners cycle less frequently, remove less moisture, and waste energy. After shooting that big blast of cool air, the excess "idle time" is when indoor humidity levels rise and that's what makes you uncomfortable.



What you really want is one ton of BTU for every 1,000 square feet of conditioned floor space. Check with an air conditioning technician to see if your unit meets these requirements.

If you find that your air conditioning system is oversized, or is an older model that you'd like to replace, be sure to purchase one with the highest SEER rating as possible (Seasonal Energy Efficiency Rating). The Energy Policy Act of 1992 requires units to have a rating of at least 10. While it is true that your costs of purchasing a more energy efficient unit will be slightly higher than a non-efficient one, the cost of purchasing higher rated units pays for itself in an average of three years and then several times over during the life of the unit.

After checking out the size of your unit and while deciding whether to replace it, there are three fairly simple steps that are extremely cost effective to keep yourself more comfortable at home .

First, use circulating fans. Ceiling, floor and table fans cool your skin by increasing bodily heat loss through convection and sweat evaporation. Moving air from these fans can make you feel 4 – 8°F cooler than the room's temperature when the circulating fan's air speed is running at 100 – 350 feet per minute. Air speed is exceeding 350 feet per minute when papers begins rustling on tabletops. These fans only cost about 2/10 of a cent per hour to operate compared to a range of sixteen to fifty-two cents per hour for central air conditioners.



Second, open all registers and doors. An old practice is to close off registers and close the doors in unused rooms, reasoning that this is "wasted space" and that more conditioned air will be available for the rooms actually used. Instead, closing off registers and doors reduces airflow through the entire house system (ductwork), lowering its efficiency and ability to cool. So, open all doors and vents and allow the air conditioner to function as designed.



Third, consider applying reflective film to windows. Single-pane, unshaded windows allow 85% of the solar heat striking them to transmit into the interior space. Reflective films can block 50% to 75% of the solar heat, which decreases the amount of cooling needed.

Personal comfort is achieved by lowering air temperature and managing humidity levels. Using fans and allowing your home's designed airflow movement to function fully will lower the air temperature you experience. And remember that the air conditioner must run for significant periods of time to remove moisture. A system you hear running frequently helps keep the relative humidity at less than 60%, which will suppress mold and microbes that are linked to respiratory problems. So, a frequently running system helps alleviate health concerns as well as increasing personal comfort.

Besides the comfort and health aspects of staying cooler, it's also interesting to note the costs of three mechanical means of staying cool. The costs by type of equipment are:

Central air conditioner	.16 – .52 per hour
Room air conditioner	.04 – .24 per hour
Whole house fan	.02 – .05 per hour



Final considerations for staying cool

According to national residential energy expert John Krigger, a large shade tree can produce daily cooling effects similar to five average-sized air conditioners running 20 hours per day. In fact, they can reduce air temperatures as much as 9 degrees Fahrenheit. Temperatures directly under trees can be up to 25 degrees cooler than temperatures above nearby blacktop. So, planting trees or purchasing a home with a lot of trees providing direct shading is a good consideration.

The color of your home's roof and exterior is also important. Bright white reflects 80 – 98% of incoming solar heat gain while darker colors absorb 40 – 95% of incoming solar radiation. The same is true for your vehicle, so if you are often uncomfortable in the summer, consider light color paint.

Applying reflective film to the windows will considerably decrease the heat transmitted into a room. Remember the desired humidity levels for winter and summer to ensure your windows last. If the humidity levels are too high, those windows will probably experience condensation. This is bad for your windows and, in terms of health, can lead to the respiratory ailments mentioned earlier.

Insulation in attics should be at least R-38 to help prevent conditioned air losses from the home and guard against excessive, incoming heat transmission.

Similar to insulation is the need to protect air from leaking into or out of your home. Air leakage is estimated to occur at wall outlets (20%), ducts (14%) and windows (12%). The steps to reduce this are fairly easy. Place a hand around windows and doors on a windy day. If you feel air movement, be sure to caulk or weather-strip. Pay close attention to where dryer vents, air conditioners, vents and fans, or any other two materials meet. These are places to weather-strip.

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Professional help

The tips and strategies outlined in this pamphlet could help you reduce energy costs and increase personal comfort. There are many tools available for free on the Internet and provided by the U.S. EPA at <http://www.energystar.gov>.

If you'd like to have the help of a trained professional who specializes in home energy matters, check out the list of qualified raters in your state at <http://www.natresnet.org/dir/raters/default.htm>. These raters can offer energy efficient recommendations based on a careful analysis of your home. They can also help you explore answers to questions like the best roof vents to use, the impact of skylights on heating and cooling, and comparing the benefits of heat pumps, geothermal and electric furnaces.



These tips and recommendations for homeowners in the states of Iowa, Kansas, Missouri and Nebraska are generally expected to save up to 30% on utility bills. Please check our web site at <http://www.epa.gov/region07> for updated strategies.

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