



Heating and cooling *your home*



Conservation – your greatest defense against high heating and cooling costs

You probably remember hearing your parents say, “Close the door; we can’t afford to heat the outdoors!” That’s because heating is the largest energy expense in most Midwest homes. In fact, about two-thirds of your annual energy bill goes to heat your home.

Cooling your home isn’t cheap either.

That’s why conservation measures that reduce the need for heating and cooling energy, like closing the door when it’s cold outside and shutting the blinds when it’s sunny and hot outside, provide great cost savings. The potential for savings is even greater when teamed with high-efficiency equipment.

In this booklet, we’ll highlight the advantages of different heating and cooling systems and the tips you need to know to invest in the most energy-efficient system.



Heating your home

Your heating system, whether it’s a propane-fired boiler, a wood stove or a forced-air furnace fueled by natural gas, works to replace the heat that is lost through the shell of your home.

The amount of energy required to replace the heat that is lost depends on four things:

1. The climate in which your home is located
2. The size of the structure
3. The energy efficiency of your home
4. How energy efficient the heating system is



Since it's not always possible or practical to change the location or size of your home, reducing your need for heating energy comes from improving the energy efficiency of your home and heating system.

Heating systems 101: The basics

All central heating systems have three basic components:

1. The heat production component where fuel is converted to heat
2. The distribution system that gets the heat to where you want it
3. The controls that regulate the demand for heat

Types of heating systems

Forced-air furnace

The majority of American homes are heated with a forced-air furnace, most commonly fueled by natural gas, but they can also be fueled by electricity, liquid propane or fuel oil. A furnace works by drawing air inside a heat exchanger, where it is warmed with a flame or with heated electric coils. A blower sends the warmed air through the house using metal ducts. It enters the room through a register or grill in the floor, wall or ceiling. Indoor air is circulated continuously through the system, so a filter is used to reduce dust, pollen and other airborne particles.



Gas- or oil-fired boiler

An older home might have a boiler, fueled by natural gas, liquid propane or fuel oil. Rather than warming the air, a boiler works by heating water and circulating it through pipes to radiators. These radiators warm the surrounding air.

Electric heat pump

Another home heating option is an electric heat pump. This unit works by moving existing heat from one area to another. Because a heat pump uses electricity to *move* heat rather than *generate* it, it can actually deliver more energy than it consumes. Heat pumps move existing heat from one area to another in one of three ways:

- **Ground-to-air:** Also known as a geothermal system or ground-source heat pump, this type uses underground loops to absorb heat from the earth. This is the type of heat pump most frequently used in Midwest climates.
- **Water-to-air:** Instead of extracting heat from the outside air, this type of pump absorbs heat from ground water or surface water, such as a farm pond.
- **Air-to-air:** A condenser absorbs heat from the outdoor air (even the coldest air contains some heat) and transfers it to an indoor heat exchanger. Indoor air is warmed in the heat exchanger and circulated throughout the home.

One advantage of a heat pump is that it provides both heating and cooling capabilities in one unit. During the summer, the process is reversed to cool and dehumidify the home. Electric heat pumps are usually supplemented with a backup system, such as radiant floor heaters or baseboard units (see below), in case of extended periods of extreme temperatures. Heat pumps also use filters to reduce airborne particles and keep the unit clean.

A geothermal heat pump is the most energy-efficient choice for most homes. It uses a naturally renewable form of energy – underground heat – and requires only a minimal amount of

electricity to circulate warmed (or cooled) air through the home. Because the underground loops require extensive excavation, geothermal systems are usually installed in newly constructed homes.

How does it work?

Below the frost line (approximately four feet), the earth is a constant temperature of about 50 degrees year-round. Heat can be taken from the ground and transferred through a heat pump to the air in your home during the winter. Heat can also be transferred back into the ground during summer to cool your home.

What are the benefits?

Because the heat pump is self-contained and installed indoors, geothermal systems have low maintenance and are very reliable. And there's more:

- The ground loop piping is designed for very long life, and some manufacturers warrant their piping for 50 years.
- There are no noisy "on" cycles with blasts of hot or cold air, and no fluctuations in temperature.
- There are no flues, chimneys or carbon monoxide concerns.

And for extra energy savings, you can add an attachment called a "desuperheater" that connects your heat pump to your water heater. Then the energy from the heat pump isn't needed; it's diverted to your water heater. For most of the summer, you'll be getting virtually free hot water!

Vertical or horizontal?

The loops of plastic piping can be installed either vertically or horizontally, depending on the size and shape of your yard, the amount of existing landscaping and soil conditions. Your contractor or builder can advise you which option is better for your home.





Electric resistance heating

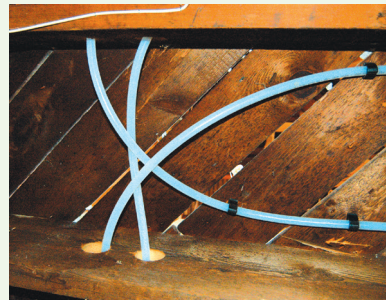
Electric resistance heating is usually found in the form of baseboard heaters. It was popular during the 1940s and 1950s, and is often used in multifamily dwellings like apartment houses.

A baseboard unit has an electric heating element encased in metal pipe. Air warmed by the heating unit rises to the top of the room, and cooler air is drawn into the bottom of the heater. Each unit has a separate thermostat to allow for different temperatures in each room.

Electric resistance heat is usually the most expensive form of heat and is seldom recommended.

Radiant heating

This form of heating is making a comeback in many new homes. Instead of circulating heat by moving the air in the room, a radiant system heats objects. The most common form is radiant floor heating, which uses electric cables or small tubes of hot water embedded in a concrete floor or under a tiled floor. During the height of its popularity, homeowners installed radiant heating in walls or ceilings too.



Homeowners in the Midwest usually use radiant heating as a supplement to a primary heating system. It's most often installed under the floor in uncarpeted areas such as kitchens, bathrooms and laundry rooms.

When should you replace your heating system?

If your heating system is old, inefficient or significantly oversized, you may save money in the long run by replacing it with new, more efficient equipment. A typical heating system with proper maintenance will last approximately 25 years.

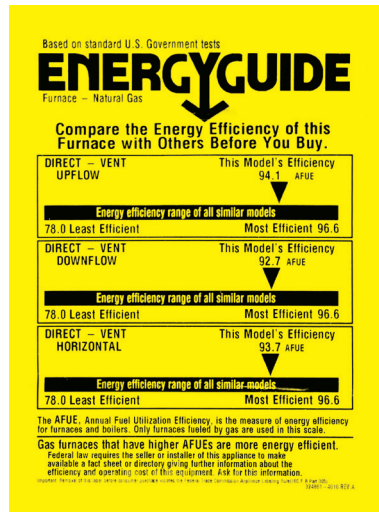


The energy efficiency of a heating system is measured by its Annual Fuel Utilization Efficiency (AFUE). This calculates the percent of energy used that is returned to the home in the form of warm air, factoring in “warm-up” and “cool-down” periods.

Today’s high-efficiency furnaces have an AFUE rating of 95%. Furnaces manufactured 20 years ago had average AFUE ratings of only 56% to 70%.

The black and yellow **EnergyGuide** label on a heating unit provides other details about its energy consumption. The largest number shows the estimated annual operating cost, based on national average utility rates. You’ll see how the appliance compares to other models of the same size.

You can also look for the ENERGY STAR® label from the Environmental Protection Agency and the U.S. Department of Energy. This identifies appliances as being the most energy-efficient products in their category. They usually exceed minimum federal energy-use standards by a substantial amount.



Choosing a new heating system

System size – a critical decision

A system that is too large wastes energy. In addition to the initially higher cost for the equipment, the rapid on/off cycling uses more energy and puts more wear and tear on the system. A properly sized unit will run almost continuously on the coldest day of the year to maintain a comfortable temperature in your home.

When replacing your heating system, the only way to determine the proper size for a new unit is through a heat loss analysis. Simply replacing your furnace with a same-size unit may not prove the most energy-efficient choice. Your contractor should do a heat loss analysis, often referred to as a “Manual J.” It includes measurements of wall, ceiling, floor and window areas. It also takes into consideration levels of insulation and weatherization.

Ask your contractor to perform a Manual J calculation, and explain the results before choosing new equipment.

Consider purchase price AND cost of ownership

When choosing the heating system for your home, keep in mind that the purchase price doesn't equal the cost of ownership. High-efficiency systems will have a higher initial price because of the more sophisticated technology involved – but the money you save in energy costs can pay for the difference in just a short time.

Your heating dealer can help you determine how much energy you can save and how long the payback period will be.

The type of system that's best for you depends on the size, style and age of your home, as well as the type of energy available.



Natural gas – a proven winner

An energy-efficient and practical choice for an existing home is often a natural gas forced-air furnace. This type of unit can reduce home energy costs by 50% compared to an electric furnace, and up to 30% compared to liquid propane or fuel oil.

Some natural gas furnaces, labeled as “super efficient,” have a secondary heat exchanger to reclaim heat from the water vapor produced by the primary heat exchanger. This option can reduce heating costs by another 20% to 30%.

If natural gas is not available in your area and a geothermal system is not an option, we recommend an air-source electric heat pump. These systems, which provide both heating and cooling, are the most efficient use of electricity and avoid the inconvenience and safety concerns of liquid propane or fuel oil.



Choosing a heating contractor

When it comes to maintaining and/or replacing your heating system, you'll want a reliable professional on your side. Here are some tips for locating a heating contractor:

1. **Do your homework.** Before you start making calls, know the make, model and age of your existing system. Make a list of any problems you are having.
2. **Look for special offers.** A new furnace is a big investment. Although price isn't your only consideration, you can still take advantage of any applicable rebates or manufacturer incentives to keep the price manageable.



3. **Find an energy-smart contractor.** Visit alliantenergy.com/dealerlocator to find a contractor in Iowa. Wisconsin residents should visit focusonenergy.com, and visit their Trade Ally section to find a contractor near you.
4. **Ask about certifications.** Ask the contractor if their technicians are SAVE System Certified. It's the leading testing and certification program. All Alliant Energy rebates require a SAVE install.

System
Adjustment
Verified
Efficiency
5. **Ask for references and call them.** Be sure to ask about performance, timeliness and accessibility.
6. **Get an in-home evaluation.** The contractor should inspect not only your current heating system, but your entire home. Only then can they determine what size system is required. Remember ... bigger is not always better!
7. **Look for the ENERGY STAR certification.** ENERGY STAR-rated products meet stringent standards for energy efficiency, as determined by the Environmental Protection Agency. Ask the contractor if the recommended equipment meets ENERGY STAR guidelines.
8. **Get it in writing.** Get an itemized estimate. Make sure it details the size, make and model of the heating system being installed and specifies any additional ductwork, etc.
9. **When the work is completed, make sure you receive the owner's manual, warranty documents and maintenance schedule for your new system.** Have the contractor show you how to change the filter and perform routine maintenance tasks.
10. **Ask about utility rebates and any state or federal tax credits for energy-efficient heating and cooling systems.** Visit alliantenergy.com/rebates for details on rebates from Alliant Energy. In Wisconsin, visit focusonenergy.com for rebate information.

Simplify your life with a clock-programmable thermostat

Your heating system will run most efficiently if you know how to use the thermostat effectively. One of the easiest ways to control energy use is to set the thermostat for a temperature that's comfortable

for you and *leave it there*. Raising the thermostat several degrees at a time will not warm your home more quickly, and frequent changes force the system to turn on and off more often.

The best way to manage your energy use is by using a clock-programmable thermostat. These devices are considered an integral part of new high-efficiency systems but also can be used with existing central heating systems.

A clock-programmable thermostat allows you to set the room temperatures at different levels for different times of day. Most even allow you to set a different program for weekdays and weekends. For example, if you go to bed at 10 p.m., you can program your furnace to automatically cut back to a lower temperature at that time. If you wake up at 6:30 a.m., you can program the system to increase again at 6 a.m., and then go back down when you leave for work. By turning your thermostat back 10 to 15 degrees for eight hours, you can save 5% to 15% a year on your heating bill.

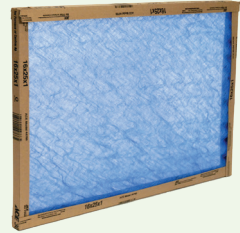
If you have zoned heating, turn the thermostats down or off in rooms that aren't being used. If you have central heating, do *not* close off registers in uninhabited areas – your system was designed to heat a specific square footage of living space and will continue working at the same pace.



Maintaining your furnace

Change filters monthly

Changing your furnace air filter monthly is one of the best defenses against costly repair bills. Heating dealers say simple dust and dirt are the cause of almost half of their service calls.



Be aware that all air filters are not created equal! Use the type of filter recommended by your furnace manufacturer or heating contractor. Look in your furnace manual for the recommended furnace filter. Most natural gas force-air furnaces just need the inexpensive one-inch filter to remove dust and debris but still allow adequate air flow through the system.

Tune up annually

An annual service checkup by a heating professional is generally a good idea – especially if you have a natural gas furnace. The technician will check the flues and temperature settings, examine the heat exchanger for cracks and check the safety mechanisms on natural gas units. A \$50 – \$100 annual tuneup can reduce your heating unit's operating cost by 3% to 4%.

Beware of carbon monoxide

Every home with fuel-burning appliances should be equipped with a carbon monoxide (CO) detector. Similar to a smoke detector, these electronic alarms alert you to dangerous levels of CO. Carbon monoxide is lighter than air and rises to the upper levels of your home, so install the detector close to bedrooms and living areas.

A properly functioning gas appliance produces harmless water vapor and carbon dioxide, which are vented out of the house. But if a heat exchanger is cracked, a flue pipe is plugged or if the pilot light doesn't have an adequate amount of oxygen, the natural gas won't combust properly, causing deadly CO to develop.

When this colorless, odorless, tasteless gas is inhaled, it enters the bloodstream and robs blood cells of oxygen. The symptoms of carbon monoxide poisoning mimic the flu – nausea, headaches, dizziness, fatigue – and long-term exposure can be fatal.

A word about wood-burning fireplaces

If you love to cozy up to a warm fire during cold winter nights, make sure you're not letting energy escape out the chimney along with the smoke. A wood-burning fireplace is one of the most inefficient ways to heat a room.

Here's why: Hot air rises, so the majority of the air warmed by the fire goes up the chimney – only a small percentage finds its way into the room. The warm air leaving the room is replaced by cold air from other areas of the house. If your furnace or other heating system is running while the fireplace is going, you're consuming energy to heat air that's being drawn into the fireplace and right up the chimney.



If you can't bear to give up your wood-burning fireplace, follow these tips to reduce your energy loss:

- Keep the damper closed whenever the fireplace isn't being used – leaving a damper open is the equivalent of keeping a two-foot square window wide open.
- Check the seal on the damper by closing it off and holding a piece of tissue paper inside the firebox. If drafts blow the tissue paper around, repair or replace the damper.
- When using the fireplace, turn down the furnace to 50 – 55 degrees, close doors leading into the room and open one window a crack to allow air to circulate.
- Tight-fitting glass doors can prevent air from escaping out the chimney, and they also improve the combustion efficiency while the fire is going.
- Add caulking around the fireplace hearth.

Natural gas fireplaces

Many homeowners enjoy the comfort of a fire without logs or matches. Natural gas fireplaces are less expensive to operate, easier to start and maintain and greatly reduce the amount of pollutants emitted into the air.

Because a gas fireplace produces less smoke, fewer sparks and no ashes, a drafty chimney isn't needed – waste gases are vented through a small pipe to the outside wall, similar to a dryer vent.

If you have a fireplace you never use – wood or natural gas – plug the chimney or vent and seal the firebox opening with tight-fitting glass doors.

Cooling your home

Much like your heating system, the efficiency of your cooling system depends on many factors like type, size and use.

Here, we'll cover:

- Repairing versus replacing an older unit
- Choosing a new air conditioner
- Using your cooling system efficiently
- Maintaining your air conditioner
- Cooling without an air conditioner



Repairing vs. replacing

According to the U.S. Department of Energy, the average home air conditioning system has a life expectancy of 15 to 20 years, depending on how often it's used and how well it's maintained. It might be initially cheaper to repair a faulty or aging air conditioner, but before you do, consider the long-term costs. A unit manufactured more than 10 years ago could use up to twice the energy of a new model.

Efficiency ratings

The energy efficiency of a window air conditioner is measured in a unit called EER – energy efficiency ratio. A central air conditioner is measured by a seasonal energy efficiency ratio (SEER).

SEER is a more complicated calculation that takes climate into consideration. Many older central air systems (prior to 2006) have a SEER rating of only 7 or 8, while a rating of 13 is now considered the minimum for new systems. If you decide to replace a 10- to 15-year-old unit with a 14.0 SEER model, you can expect to reduce your electricity usage by as much as half. Ask your dealer to calculate how much you can save.

EER is the cooling output in British thermal units (Btu) divided by the power consumption in kilowatt-hours (kWh). A window air conditioner with an EER of 10 or more is considered energy efficient.

If you're buying a window unit, the energy efficiency ratings can vary greatly between different models, so it's important to read the yellow and black EnergyGuide label before purchasing. The EER is the largest number printed on the label; you can also check the annual operating costs. Be sure to compare between models of similar size.



Choosing a new air conditioner

Installing a central air conditioner in a home is definitely not a do-it-yourself job. Air conditioning professionals must do a detailed analysis of your home and lifestyle to determine what size system you'll need. In years past, it was believed that an oversized unit would be more efficient, but it's now recommended to install a unit that's slightly undersized.

An air conditioner with a larger capacity than necessary may cool a home more quickly, but it will also start up and shut off more frequently. This uses more energy than continuous operation, just as a car uses more fuel in stop-and-go traffic than on the highway. Because it runs for a longer period of time, a slightly undersized unit will also do a better job of dehumidifying the air. The same principles also apply to window air conditioners.

Installing a new air conditioner

Installing the outdoor compressor in a shady spot can help reduce energy use by up to 10%. Be sure to maintain at least a one-foot air flow around the entire unit. Window air conditioners should also be installed in a shady area.

Appliance Cycling

When Midwestern summers bring 90-degree temperatures and high humidity levels, the huge demand for electricity puts a big strain on generating stations. Through **Alliant Energy's Appliance Cycling** program, a contractor will install a small, radio-activated control switch on or near your outdoor central air conditioner at no cost to you. The switch cycles your air conditioner, while the furnace fan continues to circulate the cooler, drier air already in your home. Conserving energy lowers your summer utility bills and helps protect the environment. Visit alliantenergy.com/appliancecycling for more information.



Maintaining your air conditioner

With proper maintenance, your air conditioner should last about 15 to 20 years. You can keep your system running efficiently with these easy maintenance tasks:

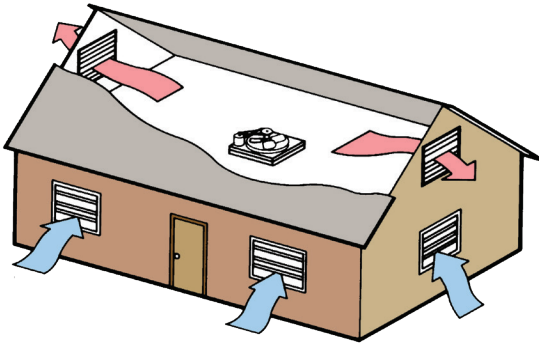
- Clean the outside compressor by gently spraying it with a hose to remove dust and debris.
- Keep plantings at least one foot away for adequate air flow around the entire unit.
- Change the furnace filter at least every other month.
- Vacuum registers and return air vents regularly.
- Have your ductwork cleaned professionally every few years.
- Keep furniture and drapes away from registers.



Cooling without an air conditioner

Before you reach for the thermostat, look around your home for other ways to beat the heat. Some are simple, others are long-term ideas, but they can help you reduce your cooling costs.

- Landscaping: A well-placed shade tree is the best cooling investment you can make – it can cut your energy consumption by 25%. General guidelines are to plant deciduous (leafy trees like oaks and maples) to the east and west, and evergreens to the north. For more details, talk to your local tree nursery or a community forester.
- Use ceiling and box fans to help circulate air throughout the house when you are present. A fan creates a windchill effect, cooling you but not the air.
- A whole-house fan is a great investment to reduce heat trapped in the attic.



- Shade south- and west-facing windows with blinds, drapes or other coverings during the hottest parts of the day.
- Turn off unnecessary lighting, and wait to use heat-producing appliances like ovens, dishwashers and clothes dryers until late evening.

It all adds up

Whether replacing your heating or cooling system or making the most energy-efficient use of your current units, conservation, safety and maintenance, it all helps get the most value for your energy dollar.

Alliant Energy is committed to helping its customers use energy safely and efficiently.

If you'd like to learn more, visit *Ways to Save* at alliantenergy.com.

You can also find great energy-efficiency tips at powerhousetv.com.

In Iowa, more information about rebates and energy-efficiency programs is available for Alliant Energy customers by calling 1-866-ALLIANT (1-866-255-4268) or visiting alliantenergy.com/rebates.

In Wisconsin, visit *Focus on Energy*, a statewide program for energy efficiency and renewable energy. To find out about Cash Back Rewards currently available in Wisconsin, call 1-800-762-7077 or visit focusonenergy.com.

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