HOME HEATING guide

A quick look at electric heating systems and ways you can make your home more efficient

Please contact Columbia River PUD for copies
HOME HEATING GUIDE

Are you thinking about changing or upgrading the heating system in your existing home? Or are you building a new home and trying to decide what type of heating system to have installed? Either way, our Energy Experts can give you tips and information regarding the features and differences of heating systems available on the market today.

This Home Heating Guide can help you operate the system you currently have more efficiently, and help you make an informed decision about which new heating system is best for you and your home.

Be the most efficient with your current heating system

1. During colder periods keep exterior windows and doors closed to keep heat in and cold out. Close blinds at night to keep warm air in and open them during the day to let sunlight help warm your home. During warmer periods, close windows and blinds during the day to keep the sun and heat out, and open them at night to let cool breezes through.

2. Insulate your home to current standards to help lower heating and cooling costs.

3. Weatherstrip and caulk around doors, windows and plumbing penetrations. Air sealing is as important as insulation, but frequently overlooked by homeowners.

4. Wear layers inside or dress according to season so heat does not have to be set too high or air conditioning too low.

5. If you heat with electricity, schedule a FREE Home Energy Evaluation to identify ways to improve the efficiency of your home. Contact our Energy Experts at (503) 366-5470 or experts@crpud.org to set up your appointment.

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Look for this icon throughout this brochure for efficiency tips.
Central Heating Systems

A central heating system allows you the convenience of adjusting the temperature throughout the house from one thermostat. Central heating systems can also include cooling, either through a heat pump which provides both heating and cooling, or through a forced-air furnace, to which a central air-conditioning system can be added. Most central heating systems require ductwork throughout the home.

Thermostats

A quality thermostat in a central heating system will keep the temperature fairly constant. In most cases, a single thermostat can control the entire system. To improve comfort, an electronic thermostat is a great idea. It will narrow the swing between the high and low temperature extremes.

Advantages

- A single thermostat controls heating and cooling for the entire house.
- Air filtration systems can be installed to remove dust, dirt, and pollens from the indoor air.
- Cooling (air conditioning) can be included as part of the system.

Disadvantages

- Ductwork, unless properly sealed, can leak heat into unheated areas such as the crawlspace or attic, wasting a lot of energy.
- Air filters must be cleaned or changed monthly for the system to operate efficiently.
- Central systems may affect house pressure, increasing air leakage.
TYPES OF CENTRAL HEATING SYSTEMS

Electric Furnace

An electric furnace is the least expensive central heating system to install, but costs much more to operate than a heat pump. An electric furnace can be installed almost anywhere in your home (although centrally located furnaces are better), and it can also be hooked up to electric air conditioning for cooling in the summertime. An electronic air cleaner can also be added.

ADVANTAGES

• One system heats the entire house to the same temperature.
• Heating/cooling registers take up very little space.
• A single thermostat can control the entire house.
• An air-filtration system cleans and recirculates the air.
• Quiet, clean, and safe; no flames, fumes, or chimneys.
• Central air conditioning can easily be added.
• Lowest installation cost of all central heating systems.

DISADVANTAGES

• Can’t be used as a “zonal” system. You have to heat the entire house.
• Expensive to operate.
• Leaky ductwork can lose heat and waste energy.

Maintenance

Since no fuel is being combusted, an electric furnace is a very clean and reliable system. Maintenance from a heating contractor is seldom needed. Clean or replace the air filter monthly to keep the system operating at maximum efficiency. Check for blockage at the registers and for things dropped into the ductwork.

Efficiency Tip: Turn the thermostat setting down while sleeping, or when the house is vacant for four hours or longer. Or, get a thermostat with a “setback”, or programmable feature which allows you to set the temperature according to your daily schedule, saving on your heating costs. When purchasing a programmable thermostat, be sure to look for one with the ENERGY STAR® label, which signifies efficiency and energy savings.
Heat Pumps

A heat pump is a ducted heating and cooling system. It is called a “heat pump” because it moves or “pumps” heat from one place to another. Using a compressor and a circulating system of liquid/gas refrigerant, heat is extracted from outside sources and pumped indoors to heat your home, and the process is reversed when cooling is needed.

Heat pumps are the most efficient choice for central heating and cooling systems. They cost more to install than electric furnaces, but cost less to operate and provide summer air conditioning, too.

ADVANTAGES

• Generally costs less to run than all other central heating systems.
• High-efficiency with no flames, fumes or chimneys.
• An air-filtration system cleans and re-circulates the air.
• Maintains comfortable temperatures year around.
• Heats and cools the home.
• Transfers heat already in the environment.
• Provides a more constant, even temperature, without the swings common to other heating systems.

DISADVANTAGES

• Larger investment than electric furnace or zonal systems.
• May cost more to service and repair than other electric heating systems.
• Filters must be changed regularly.
• Air coming out of the registers may feel cooler than with other central heating systems.
**TYPES OF HEAT PUMPS**

**AIR SOURCE** heat pumps (the most common type) remove or extract heat from the outdoor air in heating mode, and usually consists of an outside unit connected to an indoor unit. Ductwork is connected to the indoor unit to supply the heated or cooled air to rooms in the home.

**GROUND SOURCE** heat pumps use heat from the ground rather than from outdoor air. An advantage to this type is the ground stays at a more constant temperature without the wide fluctuations found in air temperatures. A ground-source heat pump is less expensive to operate than an air source. These systems have a higher initial cost than air source and the installation requires some excavation to install pipes or tubes in the ground.

**WATER SOURCE** heat pumps use a body of water, such as a pond or stream, for their source of heat. They absorb heat from the water, which is usually warmer and more stable than winter air. Efficiency is higher with this system compared to the air-source heat pump, but initial investment is also higher.

**Maintenance**

Keep leaves and other debris away from the outdoor unit to allow proper air flow. Have a heat-pump contractor perform an annual service of the system.

**Efficiency Tip:** HSPF (Heating Season Performance Factor) is a measure of heat pump heating efficiency. SEER (Seasonal Energy Efficiency Rating) is a measure of heat pump cooling efficiency. In our climate, you should buy the heat pump with the highest HSPF rating you can afford.
DUCTLESS HEATING & COOLING SYSTEMS

Ductless heating & cooling systems, as the name implies, do not require ductwork. A ductless system uses an outdoor compressor which transfers heating or cooling fluid through copper tubing to one or more indoor, wall-mounted air handlers. Those air handlers provide heating, cooling, and air filtration.

ADVANTAGES
• Saves energy and money each month, compared to other zonal heating systems.
• Low-cost, easy installation.
• Provides home heating and cooling.
• No heat losses through ductwork.
• Only heat the rooms you want to heat.
• Will not backdraft gas appliances or increase air leakage.

DISADVANTAGES
• Typically not installed in every room in the house.
• Doesn’t meet all of the heat requirements of the house. Less frequently used rooms will need baseboard or wall heaters.

Efficiency Tip: Keep windows and doors closed during cool periods. Weatherstrip and caulk your doors and windows. When you’re not using your fireplace, close the damper.
Ductless heating & cooling systems save energy compared with other heating systems. They are great for new construction, retrofits & remodels.

**Special Features of Ductless Heat Pumps**

- Offers remote control of on/off and temperature settings.
- High wall placement of air handler allows even air distribution and doesn't interfere with furniture placement.
- Affords occupants the cost savings benefits of a heat pump while allowing zonal options not found in conventional heat pumps.
- Ductless heat pumps are quieter than many forced-air systems.
Zonal heating systems have units in each room (or zone) and are a popular choice in many homes. A zone is any area isolated from other areas by partitions or doorways. For instance, each bedroom is usually a separate zone. A typical three-bedroom, two-bathroom home might have seven or eight zones. Homes with more open floor plans will have fewer zones.

Thermostats

There are two types of thermostats for zonal heating systems: electronic or electro-mechanical thermostats.

Electronic thermostats eliminate wide temperature swings and provide better comfort. Each room or area can be programmed individually and turned down as desired for maximum comfort and efficiency, or a master thermostat can be installed to control multiple zones at one time. Electro-mechanical thermostats are not recommended. They are less expensive but are slow to react allowing wide temperature swings (as much as five degrees on either side of the temperature setting) before turning the heater on or off.

ADVANTAGES

• Generally less expensive to install than central heating systems.
• Temperatures can be adjusted to different levels in each zone.
• Zonal systems do not require any ductwork.

DISADVANTAGES

• In most cases several thermostats are needed to adjust the temperature of the entire house.
• There is no good way to provide air conditioning for the whole house since there is no ductwork.
• Can be expensive to operate if used continuously.
TYPES OF ZONAL HEATING SYSTEMS

There are three types of zonal heating systems: radiant heat, baseboard heaters, and fan-forced wall heaters.

Radiant Heat

Radiant heating can be installed in the ceiling or floor of a new home. Upgrading an existing home to a radiant heating system is cost-prohibitive and not recommended.

Ceiling heat was installed in many homes built in the 1970’s with cables attached to the sheetrock or plaster. Newer, improved designs use continuous conductive mats that spread the heating over an entire panel, which is easier to install or replace and also less likely to need repairs. Radiant heating can also be installed in the floor, which some consider the most comfortable electrical heating option of all.

Efficiency may be reduced due to poor system design. It is important to do a heat-loss calculation when sizing the system. Radiant heat systems warm objects in direct line of site. Proper system design will help avoid the “campfire effect”, where you are cold on one side and warm on the other.

ADVANTAGES

• High comfort level.
• Radiant floor heat is considered one of the most comfortable heating options of all.
• Commonly a zonal system, but can be centralized.

DISADVANTAGES

• Can be expensive to install.
• Radiant heating in the floor requires sophisticated controls to prevent overheating.

Maintenance

With ceiling cable heat, you need to be cautious attaching anything through the ceiling such as ceiling fans or plant hooks because the system can be damaged. Otherwise it is a relatively maintenance free option.
Baseboard heaters are installed where the wall meets the floor. They do not require ducts, motors or fans. They operate by drawing natural air currents from the floor (where the air is cooler) across an electric element that heats the air. The heated air flows out of the top of the baseboard and radiates into the room.

When purchasing baseboard heaters, select “low density” models (not more than 200 watts per linear foot). This provides a more even heat distribution and prevents dark smudges from airborne particles collecting on the wall. Also, choose a quality product that is built to eliminate snapping and popping noises caused by the thermal expansion and contraction of the components.

**ADVANTAGES**

- As with other zonal systems, each zone (or room), can be heated to different temperatures.
- Baseboard heaters are versatile and can be installed in many types of houses.
- No heat loss through ductwork.
- Low maintenance.
- Quiet to operate.

**DISADVANTAGES**

- Their large size may make it challenging to arrange furniture without blocking the heater.
- They can be a fire hazard if combustible material (clothing, draperies, etc.) is placed on top of or too close to the heater.
- Can be expensive to operate if used as the primary heating source, especially when blocked by furniture.
- Dark smudges may appear on walls above older heaters.
- May make snapping or popping noises when heating up.

**Maintenance**

Turn off the electricity (to the heaters) and vacuum them regularly to reduce dust, pollen, etc. in your air. This also allows them to operate more efficiently through better heat transfer to surrounding air.
Wall Heaters

Wall heaters operate on the same principle as electric forced air systems; the only thing missing is the ductwork. These self-contained heaters are mounted in a metal box containing a heating element and a fan. The fan draws air into the unit, blows air across the element and warm air into the room. The units range from 500 to 4,800 watts and are available in a variety of dimensions allowing great flexibility.

**ADVANTAGES**

- As with all zonal systems, you only heat the area you want to.
- Inexpensive to purchase and install.
- Quick warm-up.
- Often used in conjunction with ductless heat & cooling systems to heat less frequently used rooms.
- Small, compact units don’t take up much wall space allowing easy furniture arrangement.
- New electronic models adjust fan speed based on heating needs.

**DISADVANTAGES**

- Fans can be noisy.
- Can be a fire hazard if combustibles are placed on top of or too close to the heater.
- Can be expensive to operate if used as the primary heating source in a poorly insulated home.

**Maintenance**

Turn off electricity at the breaker; remove grill and vacuum dust from the heater on a regular basis. Grills should be washed when removed. Some fan motors require occasional oiling, others are self-lubricating.

**Efficiency Tip:** Fan-forced systems heat rooms more rapidly than other zonal systems. Efficiency can be increased with new electronically-controlled fans available on some newer models.
SPACE HEATERS

Space heaters can be effective when used as a supplemental heat source. As with all heating systems, understanding how to properly use a space heater will help with efficiency and safety. It’s important to note that space heaters can be a reasonable way to heat limited areas, but do not replace the efficiency of a central heating system. If not used properly they can be very expensive and overall can be very impractical since they only heat small spaces and cannot be left unattended.

Space heaters do create risk of burns and fire so understanding how to use the heaters properly is critical to overall safety.

SAFETY TIPS:

- Look for the UL mark because it means the heater has met stringent safety standards.

- Do not use near water, never in a bathroom or near a sink. This prevents electrocution.

- Keep space heater at least three feet from any household combustible item.

- Only use space heaters when you are home. They should never be left on unattended.

- Find a heater that has a screen or grill around the heating coil and make sure the opening on heater screens are too small for children’s fingers to get through.

- Buy a heater with a tip-over safety switch that automatically shuts off the heater if it is tipped over, and look for one with an overheat sensor which turns the heater off if it gets too hot.

Efficiency Tip: All heaters with the same watt rating produce the same amount of heat - and use the same amount of electricity - regardless of cost, brand name, or style.
WHAT TO CONSIDER WHEN WORKING WITH CONTRACTORS

High-quality heating systems built by different manufacturers may have similar performance and durability. However, a system’s performance can be greatly affected by the quality of the installation. Choose a contractor who will help you find the best system for your home and will install it correctly to operate with maximum efficiency.

ADDITIONAL TIPS WHEN WORKING WITH CONTRACTORS:

Get Expert Help: Our Energy Experts can help you determine which type of heating system would work best for your home, and provide you with names of local contractors who could do the work.

Get More than One Bid: The low bid may not be the best bid. Request written and itemized estimates so you have sufficient information to compare including efficiency ratings, warranties and service of equipment.

Check References: Ask friends, neighbors and co-workers for contractor referrals. Ask the contractors who give you quotes to provide references, and call them.

IF YOUR SYSTEM REQUIRES DUCTWORK:

Consider Duct Design: An important part of proper installation is ensuring the ductwork can deliver adequate air flow to maintain comfort in the home, and meet manufacturers’ specifications.

Consider Duct Sealing: Air leakage from ducts can be one of the largest sources of heat loss in the home. Ducts must be sealed where sections are joined and where the duct goes through walls from unheated to heated locations in the home. Seal ducts with mastic compound, not duct tape. Properly installed flexible ductwork can be a good alternative to metal ductwork.

Consider Duct Insulation: Any ductwork passing through unheated areas (garages, crawl spaces and attics) should be insulated with a minimum of R-11 insulation for metal ductwork, or R-8 for flexible ductwork.

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# HOME HEATING COMPARISON CHART

## CENTRAL HEATING SYSTEMS

<table>
<thead>
<tr>
<th>Initial Costs (System &amp; Installation)</th>
<th>Forced-Air</th>
<th>Heat Pump (Air, Ground or Water Source)</th>
<th>Ductless Heat Pump</th>
<th>Radiant Heat (floor or ceiling)</th>
<th>Baseboard Heaters</th>
<th>Wall Heaters</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Moderate</td>
<td>Higher</td>
<td>Moderate</td>
<td>Higher</td>
<td>Lower</td>
<td>Lower</td>
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<td>Long-term Efficiency</td>
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<td>Higher</td>
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<tr>
<td>Annual Cost of Operation</td>
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<td>Service Recommendations</td>
<td>As needed</td>
<td>Annually</td>
<td>Annually</td>
<td>As needed</td>
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<td>As needed</td>
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<tr>
<td>Ductwork required?</td>
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<td>Yes</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Provides cooling?</td>
<td>Add-On</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<td>Best For</td>
<td>New homes or remods with ductwork already installed</td>
<td>New homes or remods with ductwork already installed</td>
<td>New homes, remodels or existing homes with zonal heat</td>
<td>New homes or remods</td>
<td>New homes, additions and remods</td>
<td>New homes, additions and remods</td>
</tr>
</tbody>
</table>

## ZONAL HEATING SYSTEMS

Consult your tax advisor or the Oregon Department of Energy for information on tax credits.

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