

HOME HEATING

guide

CLATSKANIE PEOPLE'S UTILITY DISTRICT

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



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Do you know what kind of heating system is in your home? 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, this Home Heating Guide will help you operate the system you currently have more efficiently and or help you make an informed decision about which new heating system is best for you and your home.

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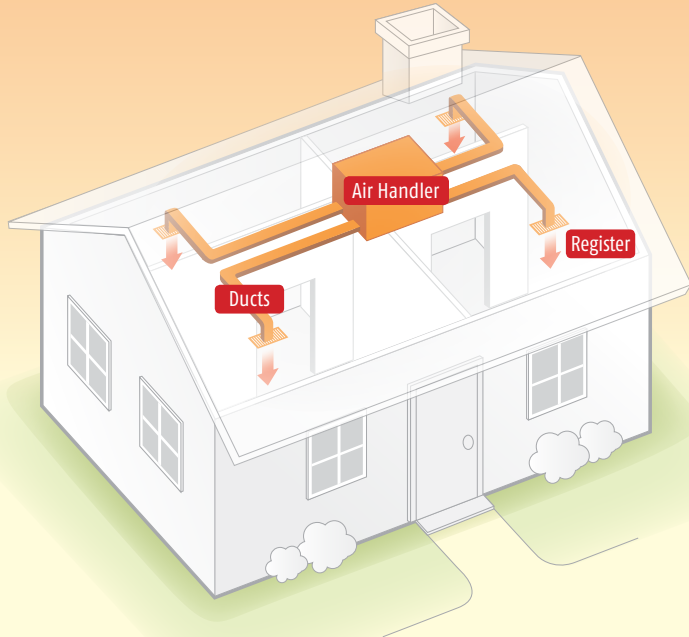
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CENTRAL HEATING SYSTEMS

A central heating system allows you the convenience of adjusting the temperature throughout the house from one thermostat. There are two types of central heating systems: forced-air and heat pumps. Central heating systems can also include cooling, either through a heat pump which provides heating and cooling, or a forced-air furnace, which will accommodate a central air-conditioning system. Most central heating systems require ductwork throughout the home.



Central heating systems are best for new homes and major remodels as ductwork is required. Learn more about ductless heat pumps on page 6.

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, which is not typically sealed, can leak heat into unheated areas (the garage, the attic) and waste a lot of energy.
- Air filters need regular maintenance but can be done yourself.
- Forced air or central systems may affect house pressure, increasing leakage.

Thermostats:

A quality thermostat in a central heating system will keep the temperature fairly constant without letting the temperature vary more than a few degrees. 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.

TYPES OF CENTRAL HEATING SYSTEMS



Forced-Air:

If you think of winter comfort as circulating warm air, then the electric forced-air system is right for you. The 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.

The system consists of:

- Furnace, containing controls, heating elements, and a fan
- Supply ducts, which distribute the heated or cooled air
- Registers (the vents where the warm air comes out)
- Return ducts, which deliver air from the house back to the furnace for re-heating
- Thermostat, which directs the furnace to heat to a preset temperature. If air conditioning is part of the system, the same thermostat can also control cooling



Warm air comes out of the ceiling or floor register (shown here), which takes up very little space in the room.

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 the re-circulated air.
- Quiet, clean, and safe; no flames, fumes, or chimneys.
- Central air conditioning can easily be added.

DISADVANTAGES

- Can't be used as a "zonal" system. You have to heat the entire house.
- Costs more to operate than a heat pump.
- Leaky ductwork can lose heat and waste energy.

Maintenance:

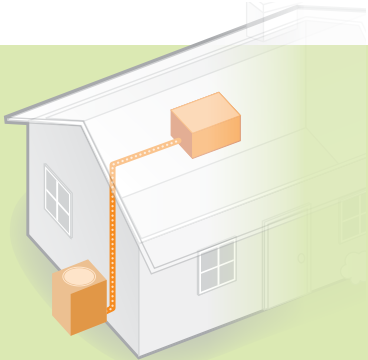
Since no fuel is being combusted, it is a very clean and efficient system. Maintenance from a heating contractor is seldom needed. Clean or replace the air filter monthly, and check for blockage at the registers. Vacuum the ductwork occasionally, or have it professionally done to remove dust and particles.

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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.



Heat Pumps

A heat pump is a ducted or ductless forced-air 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.

Heat pumps are the most efficient choice for heating and cooling systems. A heat pump supplies more heating and cooling capacity than the amount of electrical energy used to run it. The efficiency rating of heat pumps can be as high as 300%.

ADVANTAGES

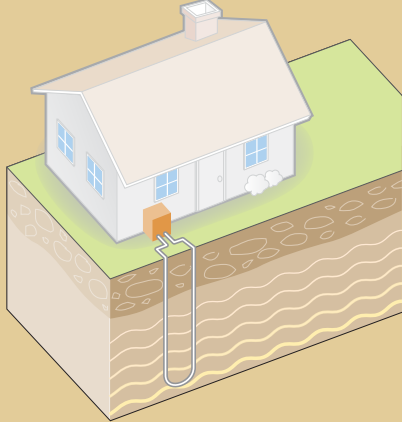
- Generally costs less to run than all other heating systems.
- High-efficiency with no flames, fumes or chimneys.
- An air-filtration system, if installed, cleans and re-circulates the air.
- Maintains comfortable temperatures year around.
- Heats and cools the home.
- Transfers heat already in the environment.

- Provides a more constant, even temperature, without the swings common to other heating systems.
- Can provide supplemental water heating.

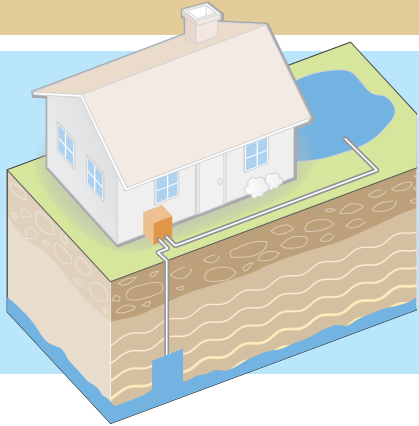
DISADVANTAGES

- 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.

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:

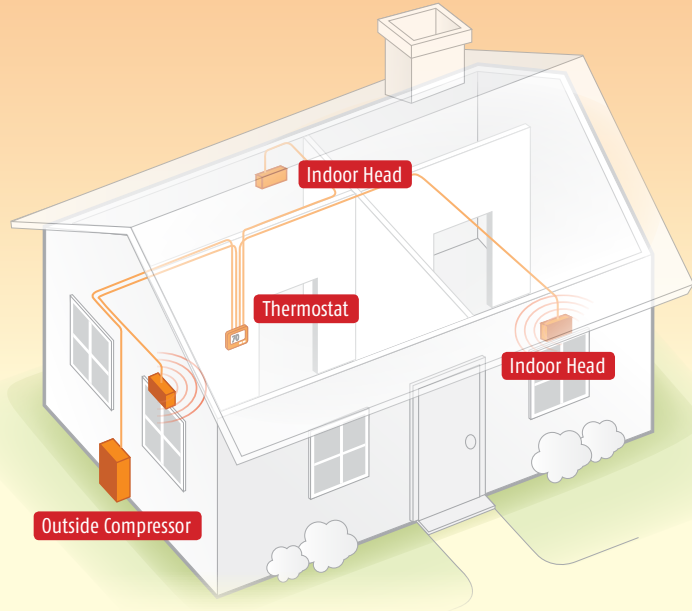
Keep leaves and other debris away from the outdoor unit to allow proper air flow. Have a heat-pump contractor perform an annual service of the system.

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DUCTLESS HEAT PUMPS:

Ductless heat pumps, as the name implies, do not require ductwork. They consist of an outdoor compressor unit and one or more indoor air-handling units, called "heads", linked by a refrigerant line. Each indoor head corresponds with a heating and cooling zone that can be controlled independently.



Ductless heat pumps are a great alternative for new construction or existing retrofits that have a zonal system already in place.

ADVANTAGES

- Saves energy and money each month, compared to other heating systems.
- You experience a more comfortable home.
- Low-cost, easy installation.
- State and Federal tax credits may apply. For more information, contact Clatskanie PUD.
- Air conditioning is included as part of the system.
- Does not affect house pressure, will not backdraft gas appliances or increase leakage.

DISADVANTAGES

- Typically not installed in every room in the house.
- Central heat pump systems more common for whole house/new applications.



Ductless heat pumps save energy compared with other heating systems and are great for new construction and remodels.

Photo courtesy Central Oregon Heating & Cooling, Redmond, Oregon

Special Features on Ductless Heat Pumps:

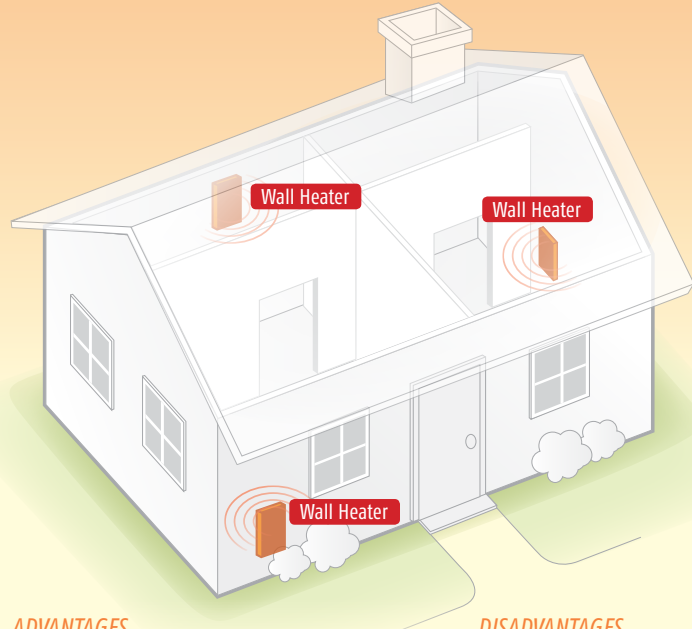
- Offers remote control of on/off and temperature settings.
- High wall placement of air handler allows even air distribution and doesn't interfere with furniture placement.
- Affords occupants the cost savings benefits of a heat pump while allowing zonal options not found in conventional heat pumps
- Ductless heat pumps are quieter than many forced-air systems

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ZONAL HEATING 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.



Zonal heating systems can now be similar to central systems; ductless heat pumps provide an easy solution. Please see page 6.

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 not a good way to provide air conditioning for the whole house since there is no ductwork. Any air conditioning addition is a retrofit, which is not as efficient and is usually more expensive.

Thermostats:

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

Electro-mechanical thermostats 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. 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.

TYPES OF ZONAL HEATING SYSTEMS

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



Radiant floor heating (as shown) is great for new homes and additions. If installed properly, it can provide a very comfortable heating option.

Photo courtesy SolAire Homebuilders, Bend, Oregon.



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, therefore creating the campfire affect where you are cold on one side and warm on another.

ADVANTAGES

- High comfort level.
- Very energy-efficient.
- Radiant floor heat is considered one of the most comfortable heating option 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, plant hooks etc. because the system can be damaged. Otherwise it is a relatively maintenance free option.

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Baseboard Heaters

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 the “low density” models (not more than 250 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.
- Thermostat set-back is required for each zone.
- Dark smudges may appear on walls due to improper maintenance.
- 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.

Baseboard heaters are inexpensive to purchase and install compared to other heating systems.

Wall heaters are inexpensive to purchase and install compared to other heating systems.



Wall Heaters

Wall heaters operate on the same principle as a forced-air system—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 3,000 watts 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.
- Provides good air circulation.
- Quick warm-up.
- Wide variety of wattages.
- 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.

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.




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. Keep space heater at least three feet from any household combustible item.
- Do not leave a space heater running 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.



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 (proper sizing, the duct system and attention to detail). The lowest bid may not be the best one. Choose a contractor who will help you find the best system for your home and will install it correctly to operate with maximum efficiency.

IF YOUR SYSTEM REQUIRES AIR FILTERS:

Two popular air filters are an "electrostatic" or an "electronic" air cleaner. These filters remove small particles from the air, including pollens. A High-Efficiency Particulate Air (HEPA) filter is replaceable and removes very small particles. HEPA filters have a greater resistance to air flow than other filters, which needs to be accounted for in the system design.

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. If possible, try to place all ductwork within the heated space. If not, make sure all seams and joints are thoroughly sealed and ducts are properly insulated.

Consider Duct Sealing: Air leakage from ducts can be one of the largest sources of heat loss in the home. Ducts need to be sealed where sections are joined – along the seams in individual duct sections and where the duct goes through walls from unheated to heated locations in the home. Mastic compound is best for doing this. Duct tape does not do the job for any length of time. 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, R-8 for flexible ductwork.



The reasons it's important to choose a properly sized system

1 COST: Larger equipment is more expensive than smaller equipment; if your system is oversized you will spend too much for it, and it will cost you more to operate as it will not be efficient. If your heat pump is undersized for heating, supplemental heat will operate too often, increasing your electric bill.

2 DURABILITY: Most wear on a compressor occurs when it starts up. Oversized equipment cycles on and off more frequently than properly sized equipment.

3 EFFICIENCY: Oversized equipment has shorter ON times, which means more time is spent getting started – the part of the heat pump cycle where efficiencies are relatively low.

Tip – Asking for a PTCS (Performance Tested Comfort Systems) or similarly rated system takes the risk out of purchasing an efficient and properly sized heat pump system.

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HOME HEATING COMPARISON CHART

	CENTRAL HEATING SYSTEMS		ZONAL HEATING SYSTEMS			
	Forced-Air	Heat Pump <i>(Air, Ground or Water Source)</i>	Ductless Heat Pump	Radiant Heat <i>(floor or ceiling)</i>	Baseboard Heaters	Wall Heaters
Initial Costs (System & Installation)	Moderate	Higher	Moderate	Higher	Lower	Lower
Long-term Efficiency	Lower	Higher	Higher	Moderate	Moderate	Moderate
Annual Cost of Operation	Higher	Lower	Lower	Moderate	Moderate	Moderate
Maintenance Recommendations	Monthly: Clean or change air filters	Monthly: Change filters	Monthly: Change filters Quarterly: Vacuum wall units	N/A	Annually: Vacuum dust, dirt & debris	Annually: Vacuum dust, dirt & debris
Service Recommendations	As needed	Annually	Annually	As needed	As needed	As needed
Ductwork required?	Yes	Yes	No	No	No	No
Can system include air conditioning?	Yes	Yes	Yes	Can be added to each room	Can be added to each room	Can be added to each room
Best For	New homes or remodels with ductwork already installed	New homes or remodels with ductwork already installed	New homes or remodels <i>*can replace zonal system</i>	New homes or remodels	New homes, additions and remodels	New homes, additions and remodels



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