



INSULATION STRATEGIES to reduce heating costs

There are many products that can be used to weatherize and insulate your house. The main objective when insulating is to create a heat-retaining envelope, one that will contain and put to best use the heat produced by the home's heating unit. To achieve this, you'll need to use different materials, each in an appropriate location. Let's talk about some different approaches and look at where they work best.

Let's start with air control. Air is constantly moving around us. In winter, the colder outside air enters the home, and the heated inside air naturally rises. These are the two forms of air movement that you need to pay the most attention to controlling – leakage of cold air from the outside into the house, and loss of heated air from the house to the outside.

External colder air enters the house any way it can. It moves through cracks around doors or windows, through gaps where the wood walls of the house connect to the masonry foundation, and through other spaces, such as around outside water faucets. It will also radiate from cold window glass. To correct air leakage, you need to close or seal the gaps. Around doors or windows, use one of the many available types of weatherstripping. For gaps between wood and masonry, or around door or window frames, caulking is the solution. (*See separate handout on "Caulking and Weatherization" for hints on how to choose and install the right materials for each situation.*) To block cold radiating from glass, add storm windows, insulating glass, or even plastic "shrink wrap" barriers to create a pocket of trapped air to act as insulation.

The warmer air that you've paid to heat is also moving inside the house. It rises up to and through the roof. To a lesser extent, it also moves out through the side walls and windows. The first step in controlling this movement is to make sure the heated air gets to where you want to use it. If you have a furnace, the warm air moves through a system of pipes, called "ducts." They can and do leak, allowing warm air to escape where you won't use it, such as in the basement. Prevent this air loss by sealing all joints in the ducts with duct tape, and by insulating ducts that pass through unheated spaces. If you have a register on your furnace for the basement, close it. (Most often, the heat that radiates from the furnace and ducts is more than enough to warm a basement.) If the heat source in your home is a boiler, it is relatively easy to insulate the water pipes that carry heat from it to the rest of your house.

Once you've made sure the heat is getting to where you want it, keep that warm air where it belongs by following the caulking procedures already outlined. In addition, close doors and turn off the heat in unused rooms. Seal around anything that passes from the heated floors into the attic (such as the chimney, water or soil pipes, or wires.) All these holes allow the rising warm air to move out of the house. **Only when you've done all these steps are you ready to look at house insulation.**

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There are several types of insulation, but all are designed to contain heat within your house. **If your attic is finished**, your best strategy is to add insulation behind the ceiling and ceiling walls. Insulating in this way will allow the heat from the other floors to pass through to warm the attic, but keep it from being lost through the roof. **If your attic is unfinished** and used primarily for storage, your most effective strategy will be to insulate the attic floor. This will retain the heat in the house below it and leave the attic cold. In either case, the goal should be to insulate the living space of the house, while allowing the roof to remain the same temperature as the outside.

In determining how to insulate your attic, it's important to consider both present and future use of the space. If you insulate the floor of an attic presently used only for storage, but later want to turn it into living space, you'll need to provide another source of heat – new heating ducts, a space heater, etc. For this reason, think carefully before you decide to insulate your attic floor.

Insulation works on the same principles that a storm window does. It traps air, and the trapped air provides an insulating barrier. That is why thicker insulation has more resistance (or “**R value**,” a measurement of the ability of a material to resist the flow of heat through it.) When you stuff or compress insulation, you reduce its R-value, because you reduce the amount of air it can trap. *(For help in choosing the best form of insulation to use or where to install it, see the separate insulation handouts in our Resource Library.)*

The same thing happens if the insulation gets damp or wet from moisture in the house. As it mats down, its R-value decreases. This is the reason that adequate ventilation in an attic is so important. Attic vents allow air movement, which carries away moisture and thus maintains the insulation at its peak effectiveness.

Just as trees, bushes, walkways, and exterior lighting all add to the total effectiveness of your landscaping plan, the various forms of insulation and weatherization work together in your house to keep the cold air out and the warm air in. When you add to these energy conservation methods some lifestyle changes, such as setting your daytime thermostat lower and lowering it even further at night, moving beds to inside walls, hanging heavier curtains, and closing off unused rooms, the savings will translate into money in your pocket, and comfort in your home.