

# Energy Efficiency and Insulation

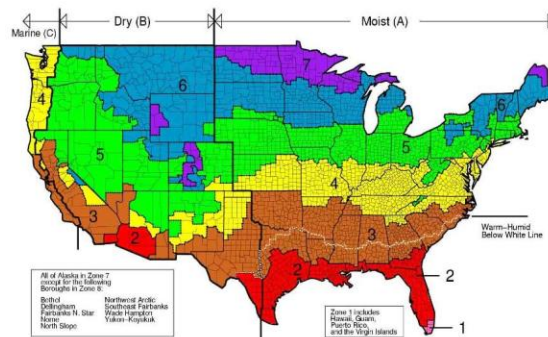
## Why insulate your house?

Heating and cooling account for 50 to 70% of the energy used in the average American home. Inadequate insulation and air leakage are leading causes of energy waste in most homes. The benefits of recommended levels and properly installed insulation are:

- Reduces home energy usage and energy costs;
- Thermal comfort
- To stop condensation in the walls and the potential for mold and rot
- To reduce the size, cost, and complexity of heating & cooling (HVAC) systems

The amount of energy you conserve will depend on several factors:

- your local climate zone ([Prescott is Zone 4](#));
- the size, shape, and construction of your house;
- the living habits of your family;
- the type and efficiency of the heating and cooling systems; and
- the fuel you use.



## How Insulation Works

- [Heat flows naturally from a warmer to a cooler space.](#)
  - In winter, the heat moves directly from all heated living spaces to the outdoors and to adjacent unheated attics, garages, and basements - wherever there is a difference in temperature.
  - During the summer, heat moves from outdoors to the house interior. To maintain comfort, the heat lost in winter must be replaced by your heating system and the heat gained in summer must be removed by your air conditioner.
- Insulating ceilings, walls, and floors decreases the heating or cooling needed by providing an effective resistance to the flow of heat.
- The effectiveness of insulation's resistance to heat flow also depends on how and where the insulation is installed. For example, insulation that is compressed will not provide its full rated R-value.
- Insulation's resistance to heat flow is measured or rated in terms of its thermal resistance or R-value. The higher the R-value, the greater the insulating effectiveness.

### Insulation Resources on the Internet

[Oakridge National Lab Fact Sheet](#)

[Dept of Energy Energy Efficiency & Renewable Energy](#)

[Building Science.com](#)

[Green Building Advisor.com](#)

## Types of Insulation

Insulation is available in batts, loose fill, rigid panels, or as spray foam. These [internet videos](#) provide overviews of the following typical types of insulation:

- Blown in cellulose in walls and ceilings
- Fiberglass batts in walls, attics, and floors
- Polyurethane spray foam

In addition, this [table](#) provides an overview of most of the available insulation forms, insulation materials, their installation methods, where they're applicable to install in a home, and their advantages.

### Insulation Slideshow

This slideshow [presents Prescott-area examples of insulation installations](#) in various parts of a home

## Where to Insulate

These are the [areas of a home which require insulation](#):

- Bottom of roof deck (for semi-conditioned, unvented attic)
- Knee walls where flat ceilings meet cathedral ceilings
- Ceilings (in vented attics) and attic hatch
- Exterior framed wall cavities and exterior wall surface
- Interior framed wall cavities (sound walls)
- Floors above unconditioned spaces (vented crawlspace, garage)
- Foundation (basement, crawlspace, slab-on-grade stemwall and floors)

[Unvented and Semi-conditioned Attics – When is it a Good Idea](#)

[Insulated and Unvented Crawlspaces – Consider the Benefits](#)

## Installation Issues

Insulation **must be properly installed** to obtain its rated performance. The three most important factors to consider when installing insulation are:

- *No gaps or voids.* There should be no gaps or voids (areas without insulation) between the insulation and the building frame. Studies show that air gaps can reduce insulation effectiveness by over 30%.
- *No compressions.* The insulation material should not be compressed. Compressed insulation can lose a substantial part of its insulating value