PUD Quick Home Energy Audit

Use our checklist to evaluate how energy-efficient your home is. Our Energy Hotline staff can help explain any item in more detail. **Look on the other side of this audit checklist for current conservation programs.** You will also find attached more information about general insulation and wall insulation.

❑ LIGHTING**

Use energy-saving LEDs wherever possible, especially in fixtures where lights are used often or left on for a long time (like a porch light).

❑ AIR LEAKS

Doors and windows on exterior walls should be caulked and weatherstripped.* All outlets and switches on walls should have foam gaskets.

❑ APPLIANCES**

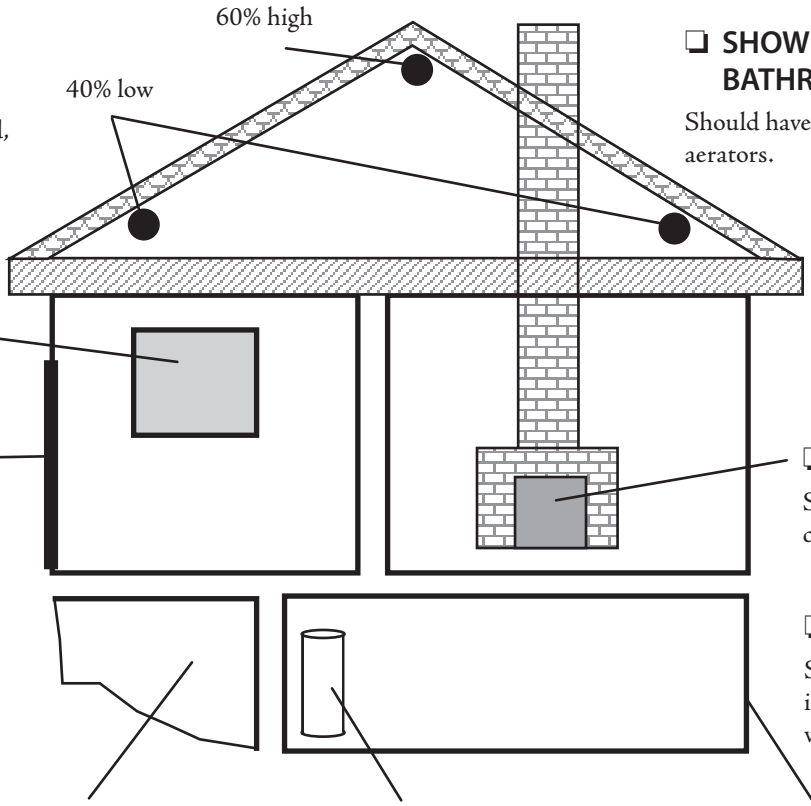
Look for the Energy Star label when buying new appliances. Only energy-efficient appliances carry this special rating from the US Department of Energy.

❑ HEAT DUCTS**

Should be well-sealed and insulated to a minimum of R-11.*

❑ VENTILATION

Should be a ratio of 1 sq. ft. of ventilation to 300 sq. ft. of attic area.



❑ SHOWERHEADS** and BATHROOM/KITCHEN FAUCETS

Should have low-flow showerheads and faucet aerators.

❑ WALLS**

If walls are not already insulated, consider blowing insulation into frame walls or fur out concrete walls and insulate.*

❑ CEILING**

If less than R-19 insulation is present, consider adding additional insulation to R-38*.

❑ WINDOWS**

Should be insulated glass or storm windows.

❑ DOORS

Should be insulated or storm doors*.

❑ FIREPLACE

Should have either an insulated cover or draft stopper.

❑ FLOOR OVER UNHEATED SPACE**

If existing insulation is 3½" or less, you need to add insulation. If it is usually more than 3½" and installed properly, this insulation is satisfactory*. Full-cavity insulation is recommended.

❑ WATER PIPES

Should be a minimum of R-3 insulation on both hot and cold water pipes*.

❑ GROUND COVER & UNHEATED CRAWL SPACE

Should be covered with 6 mil black polyethylene. No dirt should be exposed.

❑ WATER HEATER

Should have either insulating blanket (for older models) or built-in insulation (newer models have this feature).

❑ WALLS (BASEMENT)**

Unfinished concrete walls should be furred out and insulated to a minimum of R-11 to R-19*.

Energy Hotline: 425-783-1700

Monday through Friday, 8 AM to 5 PM
Toll-free in Western Washington and outside the local Everett calling area at 1-877-783-1000

snopud.com

* Several types of insulation are available. For more information about insulation and R-values, please see the attached Home Insulation/ General fact sheet or call our Energy Hotline.

** See other side for more information about our conservation programs (revised April 2017).

PUD Residential Conservation Programs

Weatherization & Heating Efficiency for Electrically Heated Homes

The PUD offers funding to qualifying customers with electric heat who install energy-efficiency upgrades, including insulation, efficient windows and sliding glass doors, and heat pumps (ducted and ductless). Pre-approval is required. **Details: snopud.com/weatherization** or **snopud.com/heating.**

Efficient Lighting

A bright way to save! The PUD offers special prices on LEDs and Energy Star lighting fixtures at participating local retailers throughout our service territory. LEDs use 90% less energy, saving you money. **Details for efficient lighting special offers: snopud.com/specialoffers**

Efficient Showerheads

Shower in savings! The PUD offers special prices on efficient showerheads at participating retailers. **Details: snopud.com/showerheads**

Efficient Appliances

Get rewarded for buying an eligible efficient appliance! The PUD's online Smart Rewards program offers a reward for the purchase of a qualifying efficient appliance (for example, clothes washer or dryer). If you're trying to decide which efficient appliance to buy, our new site offers you appliance details to help make your decision. **Details: snopud.com/appliances**

Multi-Family Conservation (Owners & Property Managers)

Interested in upgrading your insulation and windows? Cash incentives are available for approved energy-saving measures in eligible multi-family buildings. Choice of two paths: weatherization only for specific items or weatherization plus with higher incentives if you upgrade multiple measures at one time. Pre-approval is required. **Details: snopud.com/multifamily**

Build With Energy Star Northwest (for Builders)

Building in Snohomish County or Camano Island? We have incentives and rebates for heat pumps, Energy Star appliances and light fixtures. Pre-approval is required. **Details: snopud.com/newhomes**

Home Insulation

GENERAL

PUD fact sheet

As the cost of energy rises, homes can be insulated to higher levels, which can help lower your energy bills. Insulating electrically heated homes also saves the region money by reducing the need for new generating facilities.

Generally speaking, you should consider adding insulation when:

- There is little or no existing insulation.
- Attic, floor or wall cavities are exposed during remodeling.
- Low-cost weatherization measures have already been taken.
- Heating bills are still high.

Adding insulation does more than just save money on winter heating bills. It makes the home quieter, less drafty and more comfortable. It also reduces the need for air conditioning.

This fact sheet gives you general information and specific suggestions that explain how to install insulation in various parts of your home. **However, this is not a step-by-step guide.** If you use a professional contractor, this will tell you what you should expect in the process.

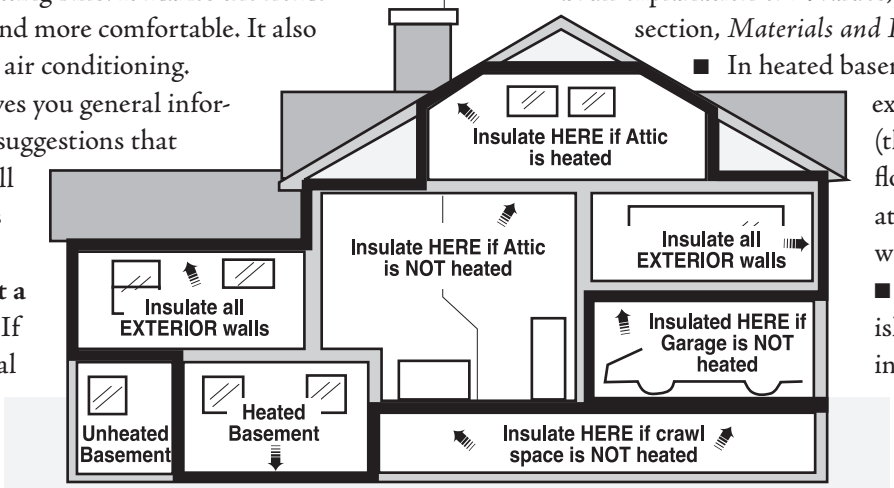


Figure 1: Where to insulate

Conservation Priorities

Any conservation effort should begin with measures that are easy, inexpensive and result in substantial energy savings. This includes the following steps where appropriate:

- Lower the temperature in rarely used living areas.
- Turn the thermostats back at night and during the day, if possible.
- Have a furnace tune-up.
- Add low-cost owner-installed storm windows over single pane windows.
- Seal and insulate furnace ducts in unheated space.
- Reduce air leakage in the home.

Next come measures which cost more money but have the potential to achieve substantial reductions in energy use. These include adding insulation and improvement of older, inefficient heating systems.

As a general rule, insulate attic, floor or wall cavities that separate heated from unheated space if they are accessible (see Figure 1). "Accessible" refers to insulation that can be installed without extensive removal of existing building materials, digging, drilling holes or other major expense. The following suggestions make good economic sense for most homes:

- In the attic, if there is less than R-19 (about 8 inches of insulation), add insulation to R-49. (For a full explanation of R-values, please see the next section, *Materials and R-Values.)*
- In heated basements, insulate exposed rim joists (the space between floor joists immediately above basement walls) to R-19.
- Insulate unfinished concrete walls in heated basements to R-19.
- Blow insulation into uninsulated frame walls only after considering other suggestions listed here.

It is possible to perform a more precise analysis of the cost-effectiveness of insulation investments. A insulation contractor may be able to assist in performing this analysis.

Materials and R-Values

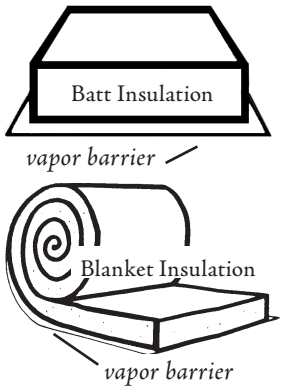
Insulation is simply a method for slowing the movement of heat. Insulating materials work in the same way that goose down works — by trapping air in tiny pockets that restrict it from moving. Heat transfer that would normally be accomplished

(continued)

through natural air movement is slowed down because the air can't move as freely.

There are three types of insulation:

- **Batt or blanket insulation** is made of mineral wool or fiberglass. It is available faced (with a vapor barrier) or unfaced (without a vapor barrier). Batt insulation is best used for crawl spaces or unfinished walls. It can also be used in ceilings where little or no insulation is already installed.



- **Loose-fill insulation** is poured or blown into the space to be insulated. Loose-fill is usually made of mineral fiber, cellulose fiber, vermiculite (mica-like substance which expands when heated), or perlite (a glossy volcanic rock which expands when heated). It is a convenient insulation type to use in unfinished attics, especially if some insulation is already installed.

- **Rigid Board insulation** (fiberglass, polystyrene or polyurethane) is usually attached with adhesive mastic. This type of insulation is used for crawl space perimeters, concrete walls and "exposed beam" ceiling.

The thickness of an insulating material isn't the only factor in determining its effectiveness. Some materials trap air more effectively than others and produce the same insulation value with less material thickness.

Insulation is rated by its ability to resist heat flow, indicated by its **R-value (resistance-value).** This number can be found on insulation packaging. The higher the R-value, the more effective its insulating qualities. When materials are combined, individual R-values are added for a total. For example, an R-11 insulation batt together with an R-19 batt totals an R-30 value.

The thickness of insulation required to achieve a given R-value varies with the material used. An average value for air-based insulation is about R-3 per inch. A typical R-19 insulation batt (roll of insulation) will be about 6 inches thick; an R-11 batt, about 3½ inches thick. Some foam insulations trap gases such as Freon (trade name) in their cells and claim values as high as R-8 per inch. These are particularly useful where space is limited. Studies indicate that over time the gas can escape and be replaced by air, resulting in an aged value of R-5 or R-6 per inch. This aged R-value is a more reliable indicator of long-term performance.

Table 1 (page 3) lists common types of insulation and some of their characteristics. You can usually tell what type of insulation you have by its appearance. For instance, cellulose is grey in color and is composed of shredded paper, while vermiculite (made from silicate minerals) is shiny brown in color and coarse in texture.

Moisture, Air/Vapor Barriers & Ventilation

Adding insulation can aggravate moisture problems. When moist air from inside the home leaks into a ceiling or wall, it may condense and wet the surrounding building materials, causing stains, mold and rot. The cure is to keep moist air out of the building envelope by sealing air leaks inside the home to form an air barrier. The air barrier also reduces heating bills by keeping cold air out.

Even with the home sealed against air leakage, water vapor can still diffuse directly through building components. So in addition to the air barrier, a good vapor barrier is required for complete moisture protection. In our heating climate, the vapor barrier always goes between the insulation and the heated space. Listed below are options for vapor barriers:

- Insulation with kraft or foil facing.
- Sheets of polyethylene or aluminum foil.
- Three coats of semi-gloss enamel on smooth interior surfaces.
- Three coats of urethane varnish on interior wood paneling.
- Vapor-barrier-rated paints over sheetrock.
- Washable plastic or vinyl wallpaper.

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Table 1: Commonly Used Insulation Materials

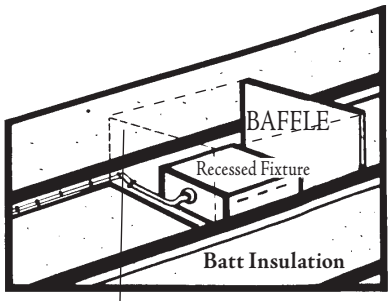
Insulation Type	R-Value Per Inch	Made From	Color/Texture	Comments
Cellulose	3.5 - 3.7	ground wood or paper	gray in color (shredded paper)	Often blown in attics and walls. Additives provide resistance to fire and mold/fungus growth.
Fiberglass batt	3.0 - 3.8	strands of molten glass	pink or yellow	Fits best in standard joist widths. Fire and mold-resistant. Eye, skin and throat irritant at time of installation.
Fiberglass loose-fill	2.2 - 3.0	strands of molten glass	pink, yellow or white	Lightest loose-fill insulation. Fire and mold-resistant. Available in blankets or batts.
Rockwool or **Mineral Wool**	2.7 - 3.1	molten rock or slag	black or gray	High fire resistance. Available in blankets or batts. Can irritate skin, eyes and throat.
Rockwool batts	3.1	molten rock or slag	black covered with paper on both sides of batt	See above.
Rigid Board expanded polystyrene	4.0	petrochemical	white	Often white "beadboard" material. Can absorb water; best used inside. Burns with toxic smoke. Needs fire barrier if used inside the home.
Rigid Board extruded polystyrene	4.6 - 5.0	petrochemical	pink, blue or green	Water resistant. Good for exterior use and below grade. Needs firm barrier if used inside. Serves as a vapor barrier.
Rigid Board polyurethane or isocyranurate	6.0 - 8.3	petrochemical	cream-colored or black	Often used as exterior sheathing, but not below grade. Absorbs water. Generally foil-faced on both sides; foil serves as a vapor barrier.
Vermiculite	2.2	silicate materials	brown and shiny (coarse in texture)	Non-combustible, non-irritating. Rarely used now in attics. Heavy. Good for chimney flue insulation.
Wood Fiber	2.5 - 3.5	chemically treated wood fiber		Compresses quickly and therefore loses insulating qualities over time.
Wood Shavings	2.5	wood		Hard to treat against fire, vermin and fungal growth. May be too heavy for some attics.

Moisture problems can be greatly reduced by producing less moisture in the home and using kitchen, bath and laundry room exhaust fans. Attics and crawlspaces must also be vented to remove moisture that gets past the air/vapor barriers and to help keep the home cooler in summer. The amount of ventilation needed depends on the size and condition of the space being vented. Attics and crawlspaces require at least 1 square foot of evenly distributed, free (unobstructed) vent area for each 300 square feet of floor or ceiling space. They may require twice that amount under high moisture conditions. Call your local building department for further recommendations on vent area and proper location of vents.

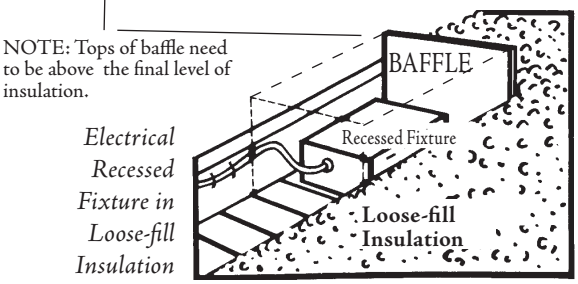
Safety

Fire safety is an important question when insulation is added to a building. Some insulation materials will not burn themselves but may contain resins or have paper-facing that will. Insulations made from wood or paper products must be treated with fire retardants to pass government inspections. **Do not install cellulose insulation unless the government specification number GSA-HH-I-515D is stamped on the bag.** Most foam insulation boards give off toxic gas if ignited and are covered with ½- or ⅝-inch sheetrock (or its equivalent) to satisfy local code regulations.

Insulation should not come in contact with heat-producing light fixtures and electrical components, or chimneys. Open-topped, non-flammable baffles maintain the required side air-space (usually 3 inches). See following illustrations. Take care that blown insulation does not drift inside the baffles. Special care must be taken with the older knob-and-tube type of electric wiring, particularly if there are problems with dimming lights and blown fuses. When in doubt, check with your local building department for advice.



Electrical Recessed Fixture in Batt Insulation



Electrical Recessed Fixture in Loose-fill Insulation

Protection Gear and Safety Tips

Insulation materials are often dusty and irritating to the skin, so wear cotton gloves and long sleeves when working with them. When installing fiberglass or rockwool, wear loose-fitting clothes that won't work mineral fibers into your skin. A cap or bandanna will help keep dust or fibers out of your hair.

A paper respirator or "surgical mask" is important for keeping dust and fibers out of your nose and lungs. For eye protection, wear a pair of plastic goggles.

If you must kneel while working in the attic or crawl space, knee pads or elastic bandages will help keep your knees from getting bruised. It's a good idea to wear shoes or boots with non-slip soles. Also consider wearing a hard hat to protect your head from protruding nails.

To wash away possible irritation from insulating fibers, take a **cold** shower afterwards. You don't want warm water because it will open your pores and allow the itchy insulating fibers to sink further into your skin.

Never smoke when working with insulation materials. Some types of insulation (such as foam rigid board) are highly flammable.

Do not install ceiling insulation on a warm day when the attic is hot and humid. This is not only uncomfortable, it is dangerous!

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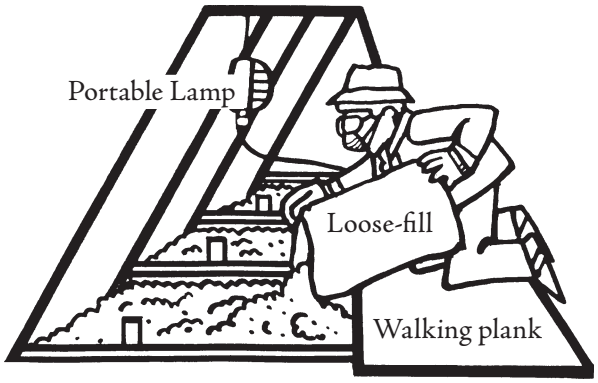

Insulating Attics and Ceilings

■ **OPEN ATTIC SPACE:**

Insulation batts or blankets are easy to install but may not fit well if joists are unevenly spaced. Running a second layer of insulation crosswise to the first helps seal cracks and reduces heat loss from joists. If a vapor barrier already exists next to the ceiling, use unfaced batts. This will prevent moisture problems from a double vapor barrier.

Loose-fill insulations fill irregular horizontal spaces and usually result in more complete coverage than batts. They can be blown from a machine or poured from bags by hand. Machines for blowing insulation are available at rental stores or from the company that sells insulation. Complete all baffling and preparatory work before blowing insulation. Start with the furthest and most difficult area to reach from the access hatch and finish with the access hatch itself. Three joist spaces are usually blown at a time, with the direction of flow parallel to the run of the joist.

As attic space narrows toward the eaves, take care to get insulation over the top plate of exterior walls while not leaving any voids between the insulation and soffit/eave baffles and maintaining 1 inch of space for air movement from eave vents. Rigid insulation can be used here to maintain full R-value with the decreased thickness.

The blowing machine must be properly set to avoid mixing too much air and overfluffing the insulation, because this can result in excessive settling later on. When work is completed, all baffling should be inspected and cleared of insulation-overblow as necessary.

Every bag of loose-fill insulation carries a label that tells you how many bags to use per area of square feet to achieve the desired R-value. Whether owner- or contractor-installed, be sure to check the label and count the bags used to make sure coverage is adequate. Cellulose is heavier than fiberglass insulation. If it is blown on top, be sure to add extra cellulose to compensate for settling of the lighter layer beneath. Be careful to maintain the required clearances around heat-producing objects.

■ **ONE-AND-A-HALF STORY ATTIC SPACE** *(see Fig. 2)*:

This type of attic presents a combination of flat and sloped ceilings, as well as short kneewalls. The three flat sections (one on top, two at the sides of the kneewalls) can be insulated like an open attic space. The kneewalls should be insulated to R-19 with an air/vapor barrier toward the heated space. It may be necessary to cut access hatches into these areas.

A number of options exist for insulating the short section of a sloped ceiling. Board, batt or loose-fill insulation can be installed between the rafters into the sloped area, leaving at least 1 inch of air-space between the insulation and roof sheathing. In this limited space, foam board gives the highest R-value. Vents should be installed in all attic spaces (top and sides).

An alternative is to fur out the sloped sections on the inside, adding insulation and a new air/vapor barrier. Two layers of foam with strapping at right angles can be used to attain higher levels of insulation. This method could be used on the kneewalls and the overhead ceiling section as well. It can also be used on open beam and cathedral ceilings. Sheetrock must form the new interior wallcovering for fire protection. With this method, if there is an existing vapor barrier, it should be punctured to prevent moisture problems associated with a double vapor barrier. A third alternative is to insulate the entire roof from the exterior as described below.

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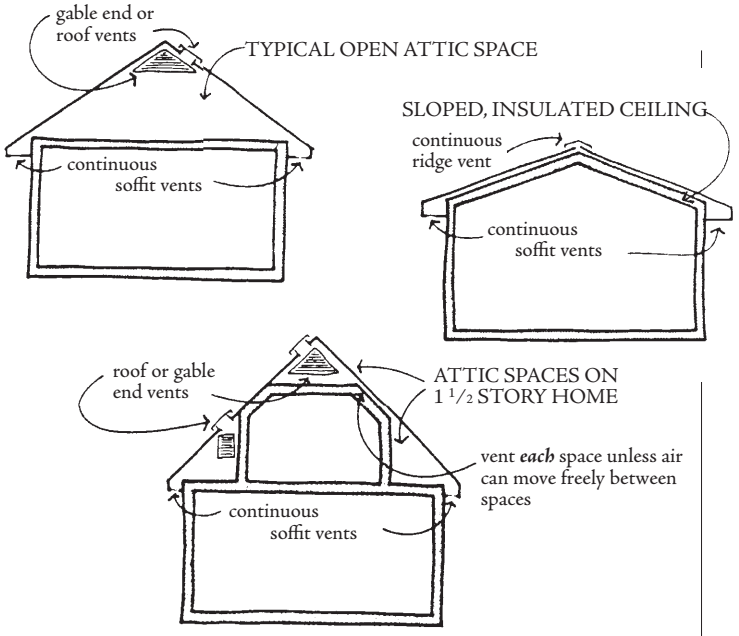

Figure 2: Attic Types

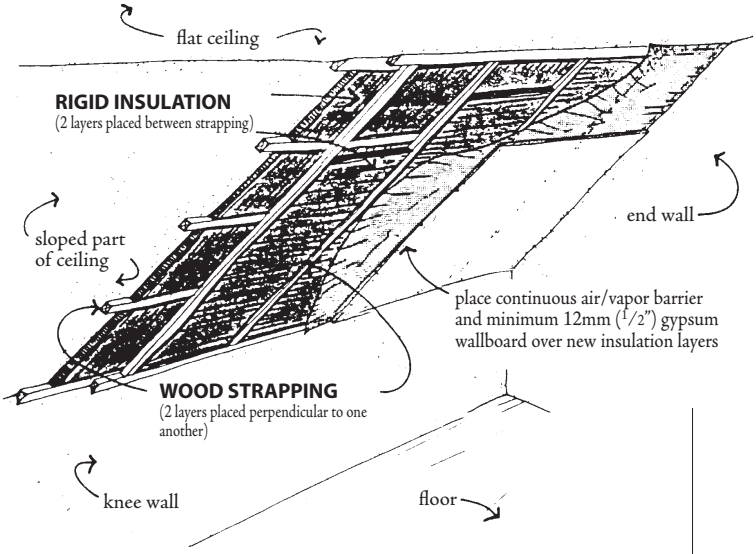

Figure 3: Insulating Interior Surface

■ SLOPED CEILINGS:

Sloped and cathedral-type ceilings can be insulated from the interior as just described, or they can be insulated from the exterior when the home is re-roofed. A variety of exterior methods are possible using either rigid or batt insulation. One possibility is shown in Figure 4. Insulating outside allows the interior to remain unchanged but is an expensive option unless the roof needs replacing anyway. An existing air/vapor barrier can be retained, or a new one can be added beneath the exterior insulation as long as there is two-thirds as much R-value above the barrier. Any ventilation in the attic below the old

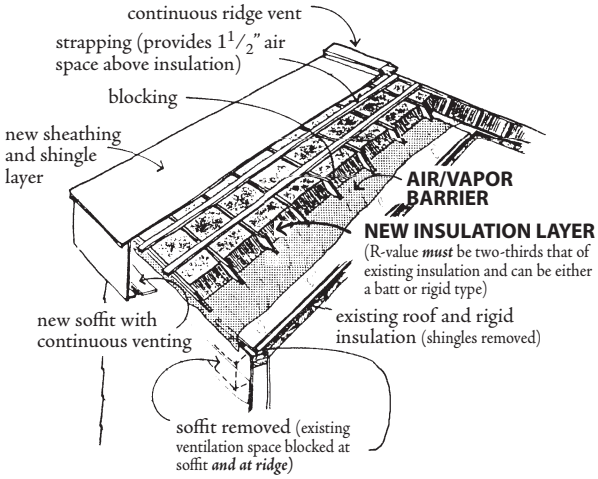

Figure 4: Exterior Roof Insulation

roof must be sealed off and provisions made for ventilation above the new insulation layer. Continuous soffit and ridge vents work well in combination.

Insulating Underfloors and Basements

After attic insulation, the next most cost-effective measure is to insulate the floor and/or basement. Insulation is placed underfloor if the space below is unheated. If the basement is heated or may be heated in the future, insulate the basement walls.

Potential moisture problems should be attended to before insulating. This includes fixing concrete wall and foundation cracks, and elimination of standing water.

■ UNDERFLOORS:

Insulate with batts of the appropriate width and depth – i.e., full cavity (R-25=2x8; R-30=2x10; R-19=2x6). The paper or foil is placed next to the floor which means the paper flange cannot be used to secure the insulation. Support the insulation from below at frequent (approximately 1 foot) intervals with wood lathe, plastic twine, galvanized chicken wire or other corrosion-resistant materials. Nails and staple fasteners must also be galvanized or zinc-coated to prevent rusting. Friction-fit wire hangers can come loose and are not recommended.

Exposed earth in a crawlspace should be covered with a 6 mil black plastic (polyethylene) sheet barrier, lapped 12 inches at the joints. Ventilate the crawlspace year round to local building department recommendations. Insulate exposed water pipes

(continued)

Figure 5: Insulating Underfloor, Basements and Crawlspaces

= *area to insulate*

Floor over unheated basement

Floor over crawl space

Floor over heated basement

Slab-on-grade

Combination basement

to at least R-3 and heating ducts to R-11. In areas with sustained freezing weather, pipe heaters may be installed in direct contact with the pipe beneath the insulation. Basements with dirt floors should be treated as a crawlspace with ground cover and provision for adequate ventilation.

■ **BASEMENT WALLS:**

After treating any moisture problems, concrete basement walls can be framed and insulated to R-19 with batts or rigid foam board on the interior. Include a vapor barrier next to the heated space. Foam boards can be glued directly to concrete, but then there is no easy way to attach the sheetrock or required fire cover. Be sure to insulate the rim joist as well (the area between floor joists, above the concrete walls).

Basement walls can also be insulated on the exterior. See figure above.

The best material for use below grade (buried) is extruded polystyrene rigid insulation. It is waterproof and will not compress with the weight of backfill. It must be covered for protection from sunlight and weathering above grade. In new construction, the board can be extended down to the footing or the frost line. In a retrofit situation, it is easier to install part of the insulation vertically to the frost line (or 2 feet minimum), with the rest sloping horizontally away from the wall for 2 feet. Insulation board is glued to the foundation with adhesive run in continuous horizontal beads to block insect infestation. Soil beneath the horizontal layer must be well compacted. **Do not excavate below the level of foundation footings.**

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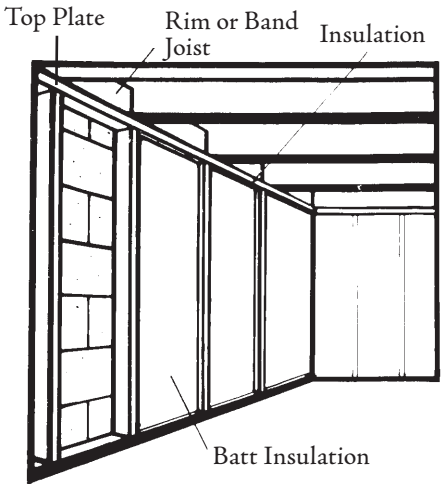

Figure 7: Basement Wall Insulation

■ **BASEMENT FLOORS:**

Insulating concrete floors in heated basements may be hard to justify economically, but it can increase the comfort level considerably. A carpet with a thick pad helps, but it is more effective to build an insulated subfloor or sleeper floor. Before insulating, check for moisture by taping square pieces of polyethylene plastic at several locations on the floors. If a damp spot occurs within 24 hours, the floor is too moist. If dry, begin by placing a polyethylene moisture barrier down, then frame and insulate a subfloor with rigid foam or batts. Shim as necessary for a level surface. Add a second poly layer for an air/vapor barrier, then add plywood sheeting and the finish floor covering.

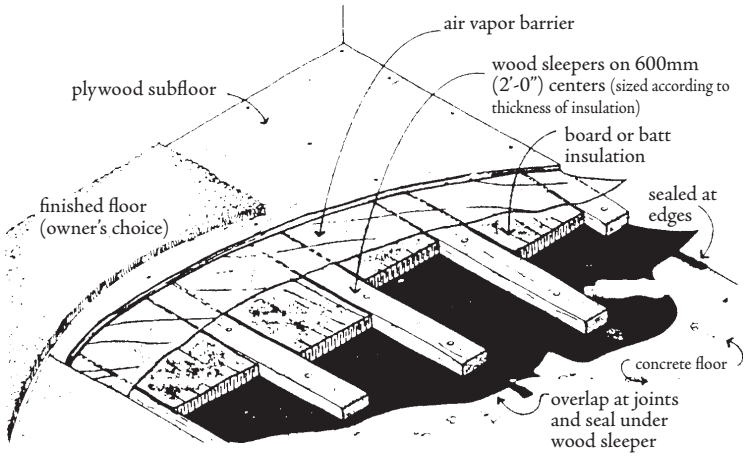

Figure 8: Basement Floor Insulation

Insulating Frame Walls

The expense of equipment and labor required to blow insulation into existing walls makes this a low priority for most homes. However, remodeling or re-siding the home presents an opportunity to add insulation less expensively.

If re-siding the exterior, rigid foam board can be applied beneath the new siding. Install ⅜" furring strips (plaster lathe) over the rigid insulation and nail siding to these strips. The furring strips allow air movement to prevent moisture-induced paint and siding failure. Do not tape joints between exterior insulation boards, but rather install a good air/vapor barrier on the interior wall surface.

Foam board can also be applied over interior walls when remodeling. If more than 1½" of foam is installed, add furring strips over the foam to provide a stable nailing base for the wallcovering. All foam insulations give off a toxic gas when they burn and must be covered with a suitable fire stop, usually ½" or ⅝" sheetrock. The interior wall should be treated as described earlier in *Moisture, Air/Vapor Barriers and Ventilation* to form the air/vapor barrier.

When remodeling involves opening a wall cavity, it is quite simple to put in the properly sized fiberglass blanket. Even when kraft- or foil-faced insulation is used, it is smart to install a polyethylene vapor barrier over the insulation to help seal air leaks.

Without remodeling, the only way to add insulation is to blow it into the wall cavities. Cellulose, fiberglass, rockwool and urethane foam are in current use, but due to problems with formaldehyde vapor, urea-formaldehyde foams are now rarely employed. Do not blow insulation into partially insulated walls, walls less than 3½" thick, walls containing electric heaters and/or water pipes. Old electrical wiring (knob and tube) requires an electrical inspection to verify the wiring is in good condition and can be covered by insulation.

The need for professional installation is one reason the cost of this procedure is high. It can be difficult to completely fill walls with insulation in some cases, and careful finishing is required to mask the drill holes. Taking time to find a reputable installer is the best way to insure a satisfactory job.

Home Insulation

WALLS

P U D f a c t s h e e t

Before installing wall insulation in homes, most consumers want to know about materials, installation techniques, potential problems, and the benefits of making such an investment. This publication provides information about problems associated with uninsulated walls, the benefits of adding wall insulation, material types, and how to select a professional contractor; **however, it does not show you how to do self-insulation.** In the overall picture of home comfort, wall insulation is a high priority. However, weatherization measures that are more cost-effective should be done first. These include caulking, weatherstripping, and insulating the attic and floor. Increased comfort and savings over the life of the home will result.

Problems With Uninsulated Walls

Most older homes were built without insulation in the walls. Without insulation, the walls lose heat more quickly to the outdoors. This wall condition can cause:

- ▲ condensation on the interior surfaces and ideal conditions for mold growth, mildew and decay;
- ▲ condensation within the wall cavity;
- ▲ drafts across the floor;
- ▲ discomfort from loss of body heat to cold wall surfaces; and
- ▲ higher heating costs due to heat loss.

Benefits of Insulated Walls

Filling the air space with insulation material increases the effectiveness of the wall component. The insulation:

- ▲ reduces drafts caused by air leakage through the wall cavity;
- ▲ keeps the interior surface warmer so a lower thermostat setting is required for comfort; and
- ▲ reduces movement of sound waves and dust so the house is quieter and cleaner.

The Materials

Cellulose is most commonly used for wall insulation. Made from shredded newsprint, cellulose is treated with fire retardants. Monitoring by industry and government assures the homeowner that the material has a standard R-value, is non-toxic and will not burn or cause corrosion of pipes or wires. Cellulose is particularly effective in wall installations because of its ability to fill and pack even tiny nooks and crannies within the cavity. Cellulose is also more effective in reducing air infiltration through wall cavities.

Mineral fibers (such as fiberglass and rock wool) are installed in some walls. Greater pressure is required to pack these materials into the cavity because they tend to catch on nails and hang up around tight places.

Gaps or voids in any insulation material account for significantly poorer thermal performance, so proper installation is important.

Getting Started

Wall insulation is more complicated to install than attic or underfloor insulation. It's best to contact a professional insulation contractor. A professional has the experience to work efficiently and effectively and to recognize unexpected problems.

Finding a contractor to do the work begins with an inspection of the house for an estimate or bid. We have a list of approved contractors who are bonded, licensed and insured. Friends and neighbors are sometimes a good source of referrals. You can also find contractors in your local phone directory or by using online referral services like Yelp or Angie's List. The inspection will give you a chance to determine whether you are comfortable in dealing with the contractor. You may want to get more than one bid. Don't be afraid to ask for recent references and to contact them. A few minutes on the phone may provide the security of knowing that you are dealing with a reputable, responsible professional.

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Comparing Bids

There are several aspects of contractors' bids to compare. Bids include:

- **Intangible qualities.** Personality and reputation leave a strong first impression. Select a contractor who respects your wishes and property and who has good references.
- **Price.** Wall insulation contractors in our area charge an average of $1.72 per square foot of wall area. The price will increase as job difficulty increases. For instance, brick and stucco exteriors can be difficult to penetrate. Drilling access holes through *interior* walls reduces the expense of access difficulties caused by masonry or asbestos shingles, high ladder or scaffold work. Rates for interior installation vary depending on the amount of time it takes to cover and clean-up the interior and whether sheetrock or plaster and lath covers the wall. (For price comparisons of other home insulation improvements, see our *Home Insulation/General Fact Sheet.*)
- **Questions to ask your contractor.** How is clean-up handled by the contractor? If the project takes two days, is clean-up done each day? Are pulley holes sealed around windows? Are gaskets installed around switch plates and outlets to prevent insulation from blowing into the house? Does the contractor foresee messy problems when insulating around the bath tub, stairwells, pocket doors or built-in cabinets? (All these areas may allow insulation to be blown into the house.)
- **Warranty.** Most contractors install products that carry a warranty for two years. Many will also warranty the labor for two years. Get both warranties in writing.
- **Other Services.** If your house needs other weatherization measures (such as attic and floor insulation or air leakage controls), can the contractor give you separate bids for each? And an estimated time of completion?
- **Discrepancies.** Compare bids for the areas that will be insulated. The unit rates may be similar, but if the areas vary, the total costs of the two will be considerably different.
- **Vapor barriers and vents.** Almost all the moisture that creeps into the wall cavity arrives through holes and small cracks on the interior wall. Very little vapor passes through the exterior wall material. So a vapor barrier such as rated paints or visqueen is not necessary. Similarly, a vent plug on the exterior is not recommended.

What To Expect

An experienced crew with good equipment can insulate the walls of an average house from start to finish in less than one day. This is the usual procedure to expect from your home insulation contractor crew:

- One crew member drills the wall cavities and probes for blocking. Another follows with the nozzle and hose from the blowing machine and fills the cavity with insulation. An ordinary wall section that is 8 feet in height requires two holes, one about 12" below the top of the wall and the other one about 3 feet from the bottom of the wall. A wall 10 feet in height may need three holes to achieve adequate compaction of the insulation throughout the cavity, depending on the equipment.
- After the insulation, the holes are plugged with a wood or plastic plug. Another option includes a plug with spackle over it. Most insulation contractors stress that this is not a finished job and matching colors and textures is not their specialty. Plugs installed without adhesive may work out over time because of changing moisture content and temperature. Patching compounds can be textured to blend with existing surfaces.
- After the work is completed, the installer is required by law to leave a certificate that specifies how much material was installed, how many square feet it covered, type of material used, date of installation, and the installer's name. To prevent settling of material (that could result in voids or gaps), contractors install more insulation in each cavity than what it holds at settled density. For example, cellulose will settle to a density of 2.3 pounds per cubic foot, but your contractor should press more than 3.0 pounds into every cubic foot. The possibility of settling is then greatly reduced.

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Savings On Wall Insulation

Investing in wall insulation pays for itself with savings on the heating bill. Average payback is less than seven years. Your actual period of payback will vary, depending on factors such as lifestyle, home construction and the cost of electricity.

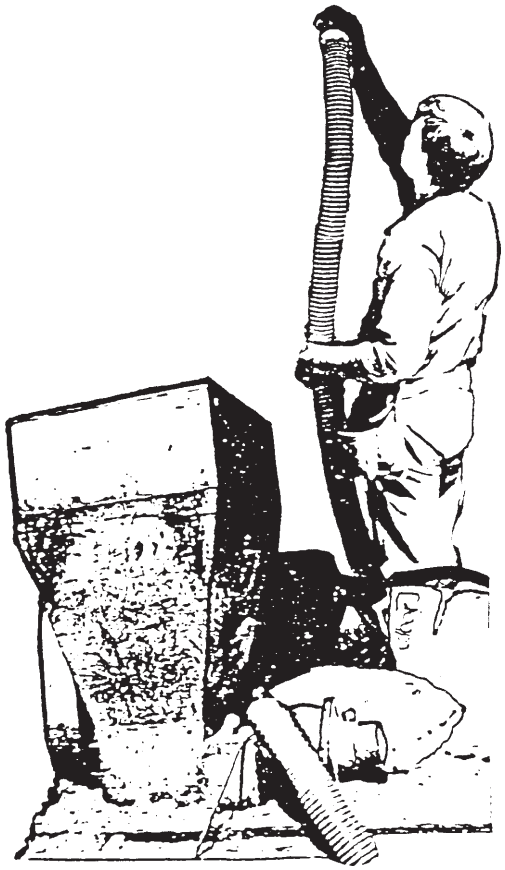
Graphics by Mike Nelson

Pricing

In 2015, the average prices paid for weatherization measures were:

- ***Ceiling:*** average cost per square foot was $1.52.
- ***Floors:*** average cost per square foot was $1.82.
- ***HVAC Ducts:*** average cost per linear foot was $7.13.
- ***Walls:*** average cost per square foot was $1.55.
- ***Windows/Sliding Doors:*** average cost per square foot was $33.77.

There are a lot of variables that may cause your project to be more or less than the above price averages.



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Rev. 2/16

Based upon information from the Washington Energy Extension Service, a Washington State Energy Office (WSEO) program that was funded by the Bonneville Power Administration and the U.S. Department of Energy.