



Insulation

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PUBLISHER'S LETTER



It may be the first of January for most, but for me, the start of
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energy home and jump-starting our crowdfunding campaign.
Though Eoghan may be leaving us, his impact here has been
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So Eoghan, we wish you only great success with your own fresh start, and to everyone in the
BTW community as your new starts begin in this fall.

All the best,

INSULATION BASICS

If you only have time and money to do one thing to your house, you'll want to make sure it's well insulated. Inadequate insulation and air leakage are key factors that waste energy in homes-so it's smart to be smart about your insulation choices.

Insulation and air sealing are key first steps to making your home more energy efficient-and this video shows you why that's the case.



Top 3 reasons to install insulation:

- It will save you money on energy costs
- You will be more comfortable in your home no matter what the season
- It will probably cost you less than you think; many states offer free or low-cost [home energy assessments](#), so you can find out from a pro the places your home is well-insulated-and where there's room for improvement. Even better, many states offer [rebates and tax incentives](#) when you install insulation.

Popular Insulation Topics:

[Insulation and Air Sealing](#)
[Where to Put Insulation in Your Home](#)
[Common Type of Insulation Materials](#)

ATTIC INSULATION

attic insulator Heat rises, and where much of it goes, the attic, is usually easy to insulate. Start with that and see how your energy bills respond.

There are several simple questions when it comes to attic insulation: where should it go, on the floor of the attic or on the underside of the roof? And of course, what material should you use? Foam, cellulose, fiberglass, or something else?

The answer goes something like this:

1. Decide what is inside or outside your building. Is the attic space inside the building envelope or is it outside?
2. It would be outside the building if there is nothing in the attic (including ductwork and HVAC equipment) and no one spends any time up there. If your attic is used for anything, it is considered inside the building.
3. If the attic is outside the building area then the insulation should go on the floor of the attic. In this case you would want to use a product like blown cellulose or fiberglass or batts of cellulose or fiberglass.
4. If the attic is inside the building area then the insulation should go on the underside of the roof (ceiling) of the attic. In which case you would want to use foam insulation.

Check out this whiteboard video for a one minute explanation!



Once you understand where your building envelope begins and ends things are pretty straightforward.

For those with a more academic approach to the world, [here](#) is a great paper from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (www.ashrae.org). Published in ASHRAE Journal (Vol. 48, April 2006), entitled Understanding Attic Ventilation by Joseph Lstiburek, Ph.D., P.Eng., Fellow ASHRAE.

BASEMENT INSULATION

First of all, we know that not all homes have basements. But if you do have one, it may be an energy pig.

Top 3 reasons to insulate your basement:

- Because heat flows naturally from a warmer to a cooler space, you are probably experiencing heat loss from your first floor living space into your basement. During the summer, the opposite occurs—heat flows from outside to your house interior and gets stuck in the living spaces.



- So the heat you lose to your basement in winter must be replaced by your heating system and the heat gained in you living space in summer must be removed by your air conditioner—or simply endured.

- When you insulate basement ceilings, walls, and floors, you provide effective resistance to the flow of heat. You're more comfortable, more energy efficient, and you save money.

What Are the Choices for Insulating Basement?

basement insulationHow you insulate your basement depends on whether it is conditioned (meaning that it is heated and cooled—generally the case in finished basements)—or unconditioned, with the space left raw. So you have some choices here—you can insulate the walls, the ceiling, the floors, or all three.

If you have a conditioned basement, first find out whether it has been insulated. (A home energy assessment will let you know this.) Once you've located the placement and amount of insulation, you can make improvements (unless, of course, your basement is perfectly insulated.)

Most conditioned basements can use insulation in the walls and floor. In unconditioned basements the best choice is going to be to insulate the ceiling. Not only will it save you energy but it was also make the floor of the first floor feel warmer; your feet won't be so cold.

What Questions to Ask A Contractor?

For a conditioned basement:

- What's the best way to add insulation to my walls and floor? For walls, contractors usually

recommend the “drill and fill” method, where loose filling insulation such as cellulose is pumped in. When it comes to your floor, a contractor can place insulated pads underneath the floor (provided the floor can be easily lifted) or you can add foam layers underneath rugs or other floor coverings.



For an unconditioned basement:

- What type of insulation will you be using, and where will it be placed? If you can see the joists in your ceiling, the contractor may recommend batts, also known as blanket insulation. Or, you might be offered sprayed foam, which expands to fill the unconditioned space.
- What can I do if I have plaster covering my walls or ceiling? You’ll probably want to consider the same “drill and fill” method used for conditioned spaces. Either way, count on a fairly short and not very expensive process. (Worried about the “drill and fill” method causing plaster or wallboard to crack or break? Under normal circumstances, this should not be a concern, since these materials are very heavy and the insulation is light. However this is another area to discuss thoroughly with your contractor.)

No matter which type of basement you have:

- Be sure to complete the job with air sealing, which is one of the key ways to maximize insulation effectiveness.
- And as long as you’re in the basement, why not insulate the outgoing pipes on your hot water heater? (Pipe insulation is sometimes included free in a home energy assessment.) If you have an older hot water heater, you may also want to insulate it with a hot water heater blanket, although most newer hot water heaters are already adequately insulated.
- Talk with your contractor about moisture control and venting, which can be a bit tricky in basements. All venting should be to the outside, not to conditioned spaces.

WALL INSULATION

Essential and Required when you are building from scratch or doing a major renovation and opening up a section of wall. **Rarely a priority for an existing home.**

Top 3 Reasons not to add wall insulation to your existing home:

1. You won't see dramatic improvements in your energy bills! Experts estimate it takes **10 to 20 years or more** to see a payback
2. It is usually a messy, tricky project
3. You can unwittingly create problems with condensation, dampness and mold

But my energy auditor told me to do it...

We have lost count of the times that a customer has called, saying they just had an energy audit and were told to have wall insulation added. **Stop right there**, we say.

Some energy auditors – particularly if they are measured or rewarded by how much follow-on work they generate – are often quick to recommend wall insulation.

But not so fast! While many existing homes – especially in areas of the country with older houses – do not have any, wall insulation should not be high the list of steps to take to make your home more energy efficient.



Wall insulation is expensive and the savings are small

As experts from the National Association of Realtors point out, models suggest that if you live in an average 2200 square foot home and you insulate your walls, [you can expect savings on your heating and cooling bills of between \\$130 and \\$300 per year.](#)

Not bad, but the cost of the work is likely between \$3,000 and \$4,000: so **the time it will take for you to earn back your investment is between 10 and 30 years.**

So what to do instead? Invest first in attic air sealing and insulation, basement insulation, weather stripping doors and windows, chimney pillows and a high efficiency or a renewable heating and cooling system before you think about wall insulation.

Did we mention that wall insulation is messy?

Assuming your walls are not completely open to the studs, as in new construction or a major renovation project, **it is hard to get the insulation into your walls.**

Generally, it means drilling holes every 12 to 24 inches in either the outside or inside walls and pumping the insulation in and then patching the holes – and if the holes were drilled from the inside,



you then typically need to repaint the wall surfaces so that the hole patches do not stand out. It's not simple to completely fill the gap in your walls with insulation, either. Obstacles such as pipes and bracing can block off the flow of insulation and create voids. Voids are bad news not just because you are not getting any insulation benefit, but also because you will have “cold spots” on your interior walls, which may attract condensation.

The only way to ensure that there are no gaps in your wall insulation is to use a thermal camera to see through the walls. And if there are gaps in the wall, then you need to drill another hole and pump that gap full of insulation. Combined, this can become time consuming and expensive.

Condensation, Damp and Mold

The final issue to consider is the risk that your wall insulation could get damp and become a wet mass at the bottom of your wall cavity. Not good for many of reasons! Wet insulation no longer insulates; it can cause problems with paint finishes and be a breeding ground for mold and insects.

So, [many advocates for historic houses are hostile to wall insulation](#). Be particularly careful if you have a brick wall with exposure to wind-driven rain. The rain will find its way through the brick!

How much does wall insulation cost?

Expect to pay between \$3,000 and \$4,000 for an average 2,200 square foot home. In some areas

of the country there are generous rebates to assist homeowners with insulation: [check here to see what is available in your zip code](#).

Installation Matters!

Make sure you get a reputable, local insulation expert to insulate your walls.

Local is preferred because knowledge of your local housing construction styles and materials is an advantage in getting the job done right – and your local expert's business depends on building word of mouth amongst friends and neighbors: if there are any issues, you can have a reasonable expectation that you will get satisfaction.



Check how your installer plans to validate that there are no voids in the walls: they should offer an infrared inspection at no charge and encourage you to look over their shoulder.

And if your project involves drilling holes into your interior walls in order to pump in insulation, make sure the quotation includes re-plastering and refinishing to the original specs!

How Do I Get Advice?

Find a Local Expert:

- Contact your local home energy efficiency club or 360Chestnut.com for an introduction to a local insulation expert who can take a look and give you advice; there may be someone who is prepared to help you with advice at little or no cost because they are committed to helping people save energy.
- If there is more than one reputable local provider, ask them both to come in and make proposals; be sure to get references and speak to some previous customers.

WATER PIPE INSULATION

Water heating can account for 14%–25% of the energy consumed in your home. You can reduce your monthly water heating bills by selecting the appropriate water heater for your home and by using some energy efficient water heating strategies.

The Top Reasons to Insulate Your Water Pipes

- Insulating your hot water pipes reduces heat loss and can raise water temperature 2°F–4°F, allowing for a lower water temperature setting. You won't have to wait as long for hot water, which will help with your water bills, as well. So that's two ways to save, with just one action.
- Insulating water pipes is easier than ever—you can even do it yourself. Pipe insulation sleeves are widely available. Simply measure the diameter of your pipes, buy the right size and amount, and slip them on.



Insulate all accessible hot water pipes, especially within 3 feet of the water heater. It's also a good idea to insulate the cold water inlet pipes for the first 3 feet.

If you have a gas water heater, place your insulation at least six inches from the flue—you need to make sure the flue isn't blocked.

Save Energy by Lowering Your Hot Water Temperature

Of course, the easiest way to save energy is to lower the temperature of your hot water heater and you don't need a contractor to do that. A setting of about **120 F** should be hot enough. You can save even more money by turning the temperature down further if you are planning to be away from home for a few days or longer. Why heat water you aren't using?



Most modern water heaters don't need to be wrapped in an insulation blanket—they're already insulated. If you have an old water heater, consider asking your plumber to evaluate its efficiency—or better yet, get a [whole house energy assessment](#), which will be free or very low cost from your utility, and may include some free pipe insulation, too!

SPRAY FOAM INSULATION

Spray polyurethane foam (SPF) insulation is being used more and more. Frequently it is referred to as water-blown foam or by the brand name Icynene. It is a modern spray-on insulation material that expands and solidifies once applied. SPF insulation is lauded for its **“green” qualities**. It has become the insulation of choice for many homeowners who are going green and building energy efficient homes. There are many attributes of SPF insulation that make it such an excellent insulation material:



- Most SPF foams do not contain formaldehyde and emit minimal amounts of VOCs compared to more traditional insulation.
- The expansive quality of SPF insulation fills gaps and stops air leakage. Preventing air leakage can be problematic for traditional types of insulation.

SPF insulation generally has a greater R-value (a measure of insulation effectiveness) than that of traditional insulating materials.

Many, including the EPA, praise the positive attributes of SPF insulation, but does it have negative qualities?

Strictly speaking, foam based spray insulation is not VOC free. However, the levels of VOC are so minute that they are negligible.

According to David Price, an environmental scientist in the EPA's Office of Air and Radiation, “no cause-effect relationship has yet been found between SPF installation and post-occupancy illnesses.” The issue is largely overblown and for most people, the little outgassing that does happen will have no health effects and will rapidly dissipate.

Remember that installation is very important when dealing with SPF insulation. The quality and durability of the insulation, to some degree, depends on the installation process. **Certified installers must be used.**