

Alaska HomeWise: Ask a Builder
By Cold Climate Housing Research Center Staff

The "Ask a Builder" series is dedicated to answering some of the many questions Fairbanks residents have about building, energy and the many other parts of home life.

There are polystyrene, fiberglass and many other types of insulation. These aren't the greenest products in the world. Is there any insulation out there that is not as harmful to the environment?

Everything is relative because it takes a certain amount of "embodied energy" to produce a product. However, as an alternative to your typical insulations, there are people building with straw bales to make houses. That is a relatively green insulation, but it still takes embodied energy in the form of fertilizers and fuel oil to produce that end product. The other end of the spectrum is the foam insulations that are largely petroleum-based. Cellulose insulation is somewhere in the middle because it is usually a recycled product. You are using something that already exists and you are giving it another life, so it's a good choice in terms of using a byproduct. Don't forget that soil is a natural insulator as well, so a bermed house will insulate very well too.

Overall, the construction industry is becoming more environmentally aware. Things are changing. Insulation companies are coming up with different types of 'greener' insulation that are using fewer traditional materials, like petrochemicals, and are using more natural ingredients. The spray foam industry is a good example. They are producing spray foam that is partially soy-based rather than 100% petrochemical. So, a product's "greenness" really depends on many factors, including the energy that goes into production, the waste from production, the safety of the material used, and the durability of the material produced, among others.

I have heard that it's better to have a cold roof than a hot roof. Why is that?

The basic principle behind a cold roof is to supply a continuous vented air space between the insulation in the roof and the plywood and roofing material on top. This is designed to keep the top of the roof close to the same temperatures as outside. The advantages of a cold roof are that it provides an airspace that will prevent heat from transferring through roof members to the snow, and, in some cases, can help dry out any moisture that has collected in the roof.

A hot roof is an unvented roof system that relies on high insulation values alone to keep the system working. A hot roof has some inherent risks, which make proper design critical. Snow itself has considerable insulating value. As snow piles up, it adds to the roof's insulative value and changes the physical point where melting will occur (outside the structure). As heat transfers from the hot roof to the snow, a cycle of melting and freezing can lead to ice dams and other problems. A well engineered hot roof design is certainly workable, and often it will require the use of rigid or sprayed in foam insulations due to their high insulating properties and resistance to air flow, unfortunately, this much insulation can also be quite expensive.

Unlike Fairbanks, there are areas where a hot roof may be quite advantageous. Areas where wind sweeps across landscape freely and snow is very fine would be a good case in point. In this situation, a vented cold roof may not be ideal since snow can infiltrate the vents and cause moisture damage.

Also, high wind areas can create huge pressure differentials across the building envelope, which can increase the force of air and vapor moving through the building. A vented roof assembly has the potential to be more vulnerable to this effect as well.

Alaska HomeWise articles promote home awareness for the Cold Climate Housing Research Center (CCHRC). If you have a question, e-mail us at akhomewise@cchrc.org. You can also call the CCHRC at (907) 457-3454