



Straw-insulated houses beat petroleum-based alternatives



Scientists are planting the seeds of bio-insulated buildings by developing innovative insulation using sustainable materials

Everybody knows one of those houses; freezing cold in winter, stiflingly hot in summer and energy guzzling all year round. Better insulation is the key to recapturing the comfort of home while cutting energy bills.

Now, a new generation of bio-based insulation materials is coming out of research laboratories.

Sceptics will wonder how these materials compare to traditional ones.

First, biomaterials such as clay and plant waste are much more environmentally friendly than their counterparts. Indeed, petroleum-based materials, such as polystyrene, have high embodied energy. This is due to the energy costs of petroleum extraction, manufacture, shipping and even disposal.

By using locally sourced plant waste, it may be possible to halve the embodied energy involved in producing

A FEW FACTS

- bio-based insulation can be made from agricultural by-products
- 20% better performance may be possible with bio-based insulation
- 94% of EU architects surveyed said they would consider novel insulation materials
- new insulation leads to greater savings than using energy saving appliances and light bulbs

insulation panels. Plant waste has the added bonus of locking CO₂ inside the insulation material, reducing its overall [carbon footprint](#).

The growing awareness of the benefits of biomaterials has led a European research project, called [ISOBIO](#), to focus on developing insulating solution relying on bio-based aggregates—such as straw or clay.

The comfort factor

A strong point with biomaterial insulation is the comfort factor. Breathability is key in keeping a building's occupants happy and healthy. Too dry, and people will suffer from dry eyes, skin and throats. Too humid, mould will make an unwelcome addition to the household.

The hygroscopic properties of bio-based insulation mean that they can absorb and store moisture from the surrounding air, according to project partner Patricia María Pérez Tarancón at Acciona, Madrid, Spain. "The material behaves as a moisture buffer," she says, "This softens the relative humidity changes in the environment, reducing risks from common pollutants such as bacteria, viruses, chemical reactions, allergies and respiratory infections, as well as reducing the need for air-conditioning."

As one expert also points out, bio-based materials can also be a healthier option. "What makes your traditional insulation itchy and carcinogenic is the formaldehyde used to bind it together," says David Garlovsky, founder of the social enterprise [Recovery Insulation](#), which is based in Sheffield, UK, and makes insulation panels from recycled cotton and denim.

Meanwhile, they are also hoping to develop bio-based binders—such as starch and casein—instead of mineral-based products like lime. "We will be exploring novel bio-based binders to see if they will be fit for purpose," says Michael Lawrence, lecturer in low carbon design in the [University of Bath](#), UK, and ISOBIO principal investigator. "We'll also be developing ways of making binders go further, or of improving the characteristics of bio-based binders," he says.

However, cost is a major barrier to widespread adoption of the technology. The research consortium hope to overcome this hurdle by reducing the total cost of insulation by an expected 15% and by reducing the lifetime energy cost of the building by at least 5%.

"Insulation is good for the wallet of home owners," says Benjamin Krick, head of component certification at the [Passive House Institute](#), Darmstadt, Germany, who researched straw bale insulation for his PhD, "The energy saving easily pays back the initial investment." He concedes that cost can be a barrier to the uptake of some bio-based insulations, but notes that "there are some exceptions, like straw bales."

Another way of overcoming cost issues, Garlovsky believes, would be to make bio-based insulations VAT exempt and extend to them the existing subsidies in this sector.

Optimism that bio-based insulation could go mainstream is justified, however, according to Lawrence. His ambition is to produce materials that mainstream construction companies can trust. “The industry is very conservative and likes to rely on manufactured, synthetic, industrialised materials, where they know that one batch is identical to another and that the materials are inert,” he says. But “It is important to get across the understanding that materials that interact with the environment can confer great benefits.”

Lawrence concludes: “There is a very successful and growing niche market for bio-based materials.”



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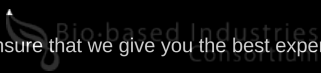
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