

Bio-based insulation materials may be the construction industry's best kept secret

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Good news for those planning to build a new home: novel insulation materials based on plant waste, such as straw, clay and grasses could offer 20% better insulation than traditional materials.

And it is not just once in place they are potentially more effective. By reducing the energy and CO2 emissions needed to create and transport traditional [construction materials](#), the reduction in total 'embodied energy' across the whole lifecycle of a building could be up to 50%.

Alan Taylor, Technology Fellow at TWI, one of the largest independent research and technology organisations in Europe, based in Cambridge, UK, explains how biomaterials can be a sustainable solution and compete on the open market. His expertise will be applied to the European research project ISOBIO, aiming to develop bio-based insulation materials to challenge traditional insulations and reduce their costs.

What are the environmental advantages of bio-based insulations?

A lot of current bio-aggregates are made from bio-products of agricultural processes, such as the stalks and stems of wheat [straw](#). By using these by-products we make the most out of existing resources. From an environmental perspective, this is a sound argument. It becomes part of a holistic solution.

It also solves another issue; a lot of conventional insulation materials are shipped across continents. Sometimes they also require a huge amount of energy to dig them out of the ground. Using bio-derived materials, such as hemp, would be much less energy-intensive than relying on these existing alternatives. The idea for future insulation material is to use solutions that do not have such high levels of "embodied energy".

Can these materials be economically viable, both for builders and for home owners?

Currently, competitiveness is very much driven from a capital expenditure perspective. Namely, it depends on how much the raw materials and their assembly cost. The operational cost of the building is often not taken into account as much. But the whole life cost is extremely important. One of the targets of the ISO BIO project is to have 20% better insulation than conventional materials and to reduce whole life cost by 15%.

Some of the products would be aimed towards new builds, but the existing housing stock is a considerable market. In my opinion, it would therefore be a commercial error not going for that marketplace.

How do you envisage bio-materials moving from niche to mainstream?

Bio-derived products are currently used as a very small niche product. This is because we do not currently have economies of scale. Competing purely on a price perspective is always going to be a challenge, as this is only an emerging technology. There will be so-called 'early adopters', who accept perhaps a higher initial cost because there is an improved cost over the entire life of the solution we offer.

Fast forward 5 or 10 years' time and methodologies will have been refined while manufacturing costs start to come down. Then, the whole life cost argument starts being more attractive, and moving into the market place becomes a little easier. It is worth noting that there is also a legislative drive from Brussels to move towards more energy-efficient buildings.

Meanwhile, as a consumer, I'm aware that the price of heating my house has gone up really quite significantly over the last few years. If I had the option to, perhaps, rebuild my house but using materials that offer better [insulation](#) characteristics, such bio-materials will be something that I would have to be taken into consideration.

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