Homes storing CO2, just like trees

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Credit: Youris.com

Houses built with bio-based materials, such as timber, straw and hemp, act as CO2 banks. Experts explain how citizens can become custodians of atmospheric carbon dioxide and thus help reduce air pollution

Domestic efforts play an important role in curbing global warming. Besides producing and using renewables, homes can also act as banks

that store CO2. This innovative building model exploits bio-based materials, such as timber, straw and hemp, which act as "carbon sequestrators."

Carbon is banked through photosynthesis made by plants during their lifetime. "Photosynthesis is the means with which plants absorb atmospheric CO2 molecules, and split them into their component atoms.

The carbon atom is retained making complex organic sugars that are the building blocks of the cellulose, hemi-cellulose and lignin found in plant cell walls. The oxygen atoms are released back into atmosphere as a by-product. Therefore, photosynthesis converts atmospheric CO2 into carbon-based materials that we can use to build and insulate our houses", says Finlay White, expert in low energy "passive" buildings.

When plants die, the ground absorbs the stored carbon dioxide, which then finds its way back into the environment. However, if we use bio-based materials in construction, the CO2 remains "imprisoned" in the buildings made.

But how much carbon dioxide can be stored in a carbon sequestration house? White explains that "depending on the extent of the renewable materials used, the gross amount of CO2equivalent stored could be as much as 55 tonnes for a typical 80m2 house. Such dwellings would typically use timber framing for the superstructure and for the internal walls and floor, straw bale insulation in the roof, timber for the cladding and finishes, and other bio-based materials for use elsewhere."

"The gross amount is the actual CO2 absorbed by the bio-based materials used in the building. The net amount will need to take account of the energy used and subsequent CO2 emissions associated with dealing with the forests and crops, and turning the materials into useful building products and delivering them to site. This is known as embodied

carbon", he adds.

"Therefore the calculation for a bio-based house will be the gross CO2 captured minus the CO2 emissions embodied in making the house. A typical 80m2 bio-based house with a gross CO2 capture of 55 tonnes might well mean a net amount of 33.6 tonnes."

White works for the Bristol-based green technology firm Modcell, which contributed to the construction of what they claim to be the world's first commercially available houses built using straw (more info in this BBC report).

They are also collaborating with the European project Isobio, which is developing "new products that include compressed straw board that can replace plasterboard, cereal fibres combined with bio polymers to make components for door cores etc.", says White, "Once a designer becomes aware of the use of bio-based materials, the potential for their use expands rapidly."

Carbon sequestration houses still remain a niche market in Europe.

Callum Hill, senior visiting research fellow at the University of Bath, another Isobio expert in the field, points out that "the building industry tends to be very conservative in its approach and prefers to use what it is familiar with. Bio-derived materials are often perceived as being perishable, flammable and short-lived. These perceptions are not supported by facts". Compressed straw bales used for building envelopes, for example, are not flammable because they contain less oxygen.

Hill thinks that governments should recognise this alternative storage of atmospheric carbon dioxide and "provide a financial benefit for custodians of it. "It is a way of storing atmospheric carbon dioxide that

can be readily achieved and without financial penalty (unlike carbon capture and storage)", he says, "This is something that can be done to the benefit of society and the environment. Anthropogenic carbon emissions are undoubtedly changing the climate and these will have huge financial implications".

Provided by Youris.com

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