

The Innovators

The evolution in building materials has recently picked up speed – here's the lowdown on what these exciting new products do and how you can use them.

Do you remember the days when a fibro shack was an innovative building? I don't, but it was at a particular stage. There were masonry buildings, and timber buildings, then the masonry became a veneer on a timber building and then there was this new thing called fibro cement. There has always been innovation with building materials (with mixed results – fibro cement sheet in its original form had devastating health impacts) but the rate and diversity of innovation within the materials industry today seems unprecedented.

Materials are being re-examined from every angle – R values, embodied energy, waste reuse, environmental impact. There are Structural Insulated Panels, phase change materials, composite flooring, insulative masonry and yes ... a low embodied energy cement sheet board that is a natural product and draws in CO₂ as it cures.

These new materials are opening up opportunities for designers to do different types of buildings, and in doing so to optimise environmental outcomes – whether it be energy use, material efficiencies or eliminating waste.

There is no doubt that the ongoing evolution of new and innovative building products is evidence that the materials industry is rising to the challenge of a sustainable material world. What follows is a brief discussion of some of the materials and products that are pushing the boundaries in building construction.

Phase change material

Of particular relevance to the issue of embodied and operational energy is a product that uses a phase change material to moderate the temperature inside a building and significantly reduce the need for heating and cooling. About one-seventeenth the embodied energy of concrete, this material acts as thermal mass – capturing the heat from the day and releasing it at night, and carrying the coolth of the night into the day.

Phase change materials are materials that can change from a solid to a liquid. Water is a phase change material – it can change from ice to water, from water to steam, and back again. This product uses vegetable fat as a phase change material. The fat is encased in pockets within plastic sheets that can be installed behind a wall or ceiling lining. The material changes from solid to liquid at around 23–25°. To change the phase requires a lot of energy, which it gets

from absorbing heat from the ambient air. However, it doesn't start to absorb heat until the ambient air reaches 18° – and this is where it differs from "normal" thermal mass. At 18° it starts absorbing heat. It continues to absorb heat until the material reaches 23°, a process which takes many hours. Ideally in winter, it obtains this heat from passive solar gain. In summer it acts to moderate the internal temperature. When the ambient temperature drops below 23° the material starts to release the heat – which is when you need the heat again. It is acting as thermal mass – but only in a narrow temperature band.

It can be used in lightweight construction and eliminates the need for high embodied energy, heavy mass material to provide thermal inertia.

BioPCM

phasechange.com.au/howdoesbiopcmworks

Panels

There are a number of different panel products creating inventive alternatives for one or many building components.

UBIQ

This product is a low-energy alternative to plasterboard and cement sheet. Made from a natural white rock that is crushed and mixed with magnesium chloride, the cement is poured into flat beds and left to naturally "cure", or dry, for two days, resulting in very low energy use from manufacture. As it cures, it absorbs CO₂. The panels have multiple applications including flooring, internal and external wall lining.

theubiqco.com

Laminam

A particularly remarkable product, this ceramic panel can be used for flooring, external wall cladding, splashbacks and benchtops. It is a 3.5 mm porcelain panel with a fibreglass backing. The porcelain is made from 90% pre- and post-consumer recycled material. The material is manufactured in Italy, close to the source of the recycled porcelain, it is coloured by natural pigments, recycled water is used in processing, and hybrid (gas and electricity) kilns are used to fire the panels. It is lightweight, robust, fire resistant and self cleaning.

livingfiles.com.au/laminam.html

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Structural Insulated Panels

Structural Insulated Panels (SIPs) are not a new idea. They have been around for decades, but their release from patent a while ago has seen many different products evolve. Essentially, they are a composite building material comprising an insulated core (typically a foam of some description) between two outer layers of structural material. They can be load bearing, fire rated, have excellent thermal properties and can be used for walls, floors and roofs. What is interesting is how some companies are adapting this standard building product to create innovative solutions to environmental issues.

Ceillink

Encouragingly, there are material suppliers considering the problem of existing buildings. There is a SIP product that can be retrofitted under an existing ceiling without having to remove or replace a roof. This allows a building owner to easily achieve excellent thermal performance with minimal alteration to an existing roof. The product can be removed and reused, and the foam core is made from recycled components.

ceillink.com.au

Ozone Panel

Another SIP product has been designed specifically for the Australian environment. It comprises a timber structural board on either side of a thermoset foam. The timber boards are made from FSC and PEFC certified wood. The thermoset foam is designed not to melt, and the product can achieve a 60/60/60 fire rating when combined with a fire resistant plasterboard.

It is lightweight, load bearing and can be used for internal and external walls, floors and roofs. One of the benefits of SIPs is that they are prefabricated, meaning a dwelling can be taken to lock-up within a few days of the panels being delivered to site.

ozonepanel.com

Masonry

Island Block

There have been many innovations in the masonry sector over the years. A recent addition is a range of brick and block products manufactured with up to 40% recycled glass aggregate, sourced from recycled glass products. The recycled glass has a cementitious value as well, meaning the cement usage is reduced by 10%, lowering embodied energy.

islandblock.com.au/sustainable-products

Clinka

Another particularly interesting masonry material is an insulating lightweight, expanded clay aggregate, which is manufactured into three different products:

- a loose granular gravel-like material that can be used as an insulating fill under a slab, or crushed as a substrate for a green roof;
- a range of masonry blocks for constructing walls and insulating footings;
- a range of precast panels that can be used for walls and floors.

These are nearly half the weight of concrete, which means more efficient transport requirements and smaller cranes on site.

This material is particularly innovative as a concrete slab replacement, as combining the different products can provide an insulated structure around and under the floor.

clinka.com.au

Internal Materials

Wicanders Corkcomfort

There is a new generation of flooring options emerging, including a cork floating floor product that combines the benefits of cork with the advantages of fibreboard. A composite material, it sandwiches a high density fibreboard between layers of cork. The cork is prefinished and the board requires very little maintenance. Cork is a very renewable resource, and this product provides the soft feeling of cork on a hard base, in a range of patterns and colours.

ecologiconline.com.au/corkcomfort.aspx

eco by Cosentino

Another ceramic-type product used for benchtops, flooring and internal wall lining is made from 75% recycled materials such as mirror, glass, porcelain and earthenware.

ecobycosentino.com/australia/index.html

Paperock

A kitchen bench made from paper? It seems like an unusual idea. And yet, this strong composite material is made from paper sourced from 60% recycled or sustainable sources and manufactured into a bonded sheet that can be used for kitchen benches, cabinetry, table tops and internal lining.

paperock.com.au

Novofibre

These panels are made through hot-pressing wheat straw stalks, a waste material. They can be used as a construction or as a surface material for a wide variety of applications and have excellent acoustic properties.

novofibre.com

It is truly exciting – the types of new materials and what they can do. The complexity comes in knowing how to integrate them in each unique design situation. One of the biggest problems with innovative materials is that there is usually only one option on the market, which means you are 100% committed to a material and supplier. Even so, it is worth trying to push the boundaries – it will take some time to work out all the opportunities and piece them together, but as I found out when writing this article, you'll get to talk with a lot of fascinating and committed people.

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Thanks to David Baggs from Ecospecifier for his tips on emerging products. ecospecifier.com.au



ANY BUILDING • ANY SURFACE • ANYWHERE

UBIQ is a provider of high performing, low carbon, lighter weight products. **INEX > BOARDS** are an environmentally friendly, cost effective alternative to fibre cement products. Product range includes weatherboards, renderboards and internal/external flooring systems.

- NEW - BAL-FZ Fire Rated Systems
- Domestic / Commercial applications
- High Acoustic Properties
- High Impact Resistance
- 100% non toxic & 100% recyclable

