

# Sanctuary

MODERN GREEN HOMES

ISSUE  
56

SUSTAINABLE HOUSE  
DAY SPECIAL

DEEP DIVES: Building & design | Retrofitting  
Building materials | Climate resilient design

**Best and fairest**  
Australia's eco homes on show



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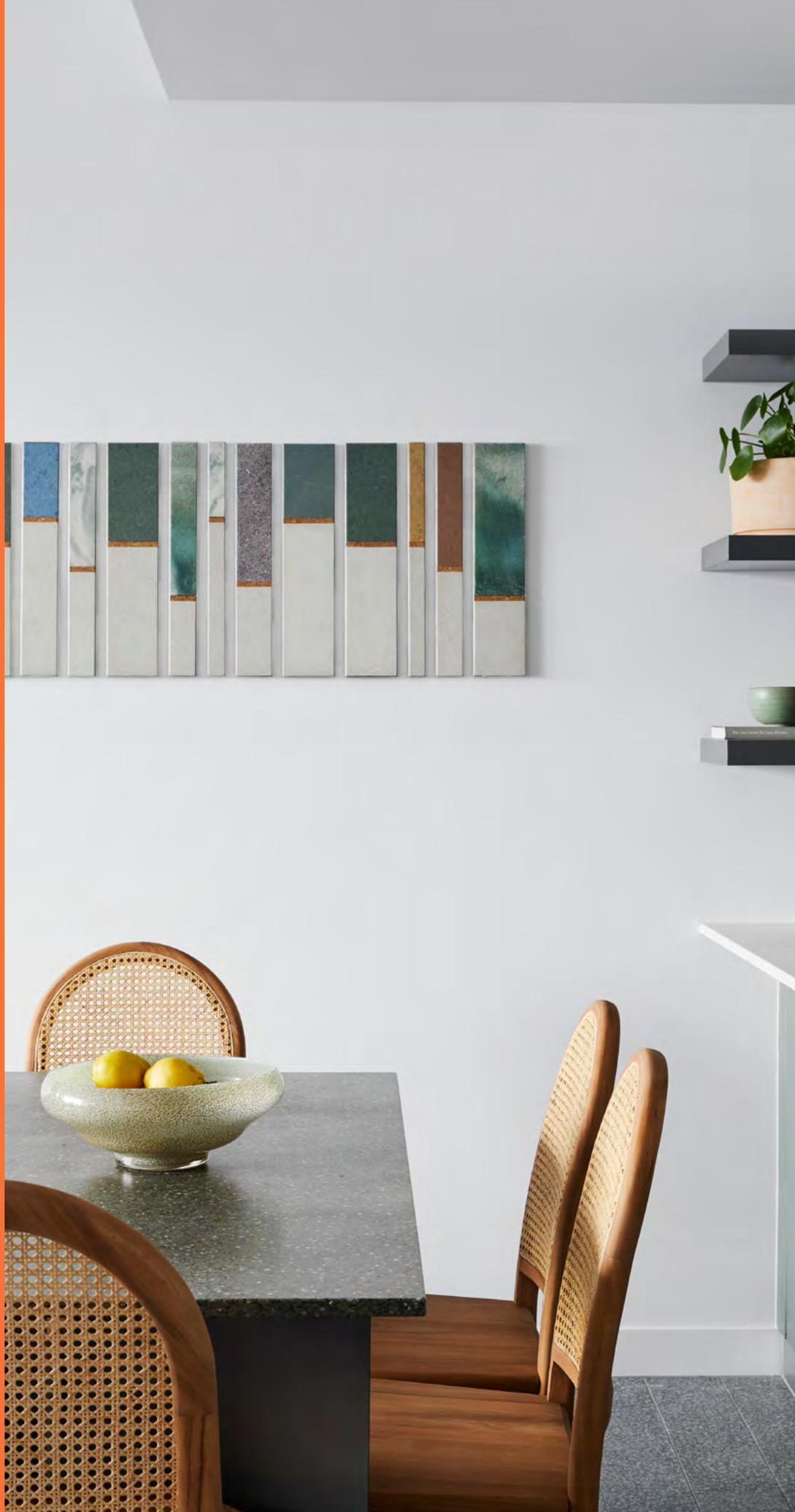
# BUILDING MATERIALS

As we aim to reduce our impact on the earth, the materials we use to build our homes are as important as our designs. The wrong material can not only contribute to pollution or deforestation, it can also undermine your home's performance.

Week 3 of the Sustainable House Day program is all about building materials. First, on Tuesday 5 October we'll look at natural materials like hempcrete, strawbale and rammed earth that can make your home healthy, highly functional and sustainable. Then, on Thursday 7 October, our experts will dig into the details of how the right windows can increase your home's efficiency and thermal comfort.

**Sustainable  
House Day**

See the full program at  
[sustainablehouseday.com](https://sustainablehouseday.com)



## PUTTING WASTE TO WORK:

‘Green ceramic’ building products from recycled glass and textiles

WORDS Jodie Lea Martire



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At the Pavilions apartment, ‘green ceramics’ made from recycled glass and textiles have been used in a wide range of applications including floor and wall tiles, lights, tables and artwork.

**Repurposing waste materials into new building products makes sense on several environmental levels, and one research and industry collaboration is pulling it off to great effect with a range of tiles, fixtures and even artworks made from ‘green ceramics’.**

It’s a rarity in the construction industry to find recycled glass throughout the kitchen, repurposed fabric scraps in the floor, and wall art made from a slick combination of the two. But that’s exactly what you’ll find in this display apartment by a major developer – and it’s just what makes it a worthy winner of the Architecture and Construction category of the

Circle Awards, which recognise advances towards a circular economy.

The two-bedroom Pavilions apartment at Sydney Olympic Park is the result of a multi-year collaboration between urban property group Mirvac and the Centre for Sustainable Materials Research and Technology (or SMaRT Centre) at the University of New South Wales (UNSW). Unveiled in March this year, the apartment showcases an industry-first use of waste glass and textiles, converted by the SMaRT Centre into a material called ‘green ceramics’ and featured in a variety of applications. The floor tiles come from cullet (ground-up glass waste) combined with scraps from old beanies, which give them black speckles. Other tiles with different glass/textile blends have been used in the kitchen splashback



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The black-and-grey terrazzo look of the floor tiles is derived from the glass and black fabric they contain. These tiles underwent stringent testing to ensure they met durability and slip-resistance requirements.

and island bench front, while the range of moulded products include the dining table, pendant lights and the sculptural piece on the wall. Variations of the green ceramic appear in unobtrusive items like the couch's feet and a lampstand, and in dramatic contributions like the illuminated feature wall made from glass plus jute fibre from recycled coffee sacks. Together, these elements enhance the apartment's clean-cut, industrial-chic vibe.

For Mirvac, this apartment represents a significant step towards the commitments made in its sustainability strategy, titled 'This Changes Everything'. The global construction industry uses almost 50 per cent of the 92 billion tonnes of resources extracted from the earth each year, and the National Waste Report 2020 states that the Australian industry produces 27 megatonnes, or 44 per cent, of our annual landfilled waste. In this context, Mirvac aims to send zero waste to landfill by 2030, part of its efforts to consider the lifecycle of all products and materials it uses and move towards a more circular business model. As Toby Long, Mirvac's NSW General Manager Residential, says, "Take, make and waste' is not a great way of being. How do you make the waste part of the 'take', in other words part of the cycle?"

The Pavilions apartment provides a beautiful, high-performance example of that circular model in practice. Green ceramics are produced in the SMaRT Centre's trademarked MICROfactories, which process and re-manufacture waste into commercially viable products. In this case, ground glass and shredded textiles are heated, blended and pressurised to create the various green ceramic products. As SMaRT Centre founder Professor Veena Sahajwalla says, "Waste is one of those

untapped resources just waiting to be harnessed" – and in this case, that could mean the 23 kilograms of textiles and the 43 kilograms of glass that the average Australian sends to landfill each year. Significant energy is also saved in remanufacturing through the MICROfactories, as reheating the glass requires much lower temperatures than virgin glass smelters (which can hit 1,700 degrees Celsius).

The SMaRT Centre has also designed MICROfactories that revitalise hard plastics and e-waste. MICROfactories have a small physical footprint and can operate on or close to building sites: this minimises transport needs, capitalises on nearby waste sources and enables local manufacturing businesses. "That's when you create new jobs and 'economies of purpose'," says Veena, "which are much more vital and caring than purely commercial 'economies of scale'."

Before the green ceramics could be installed in the Pavilions apartment, they had to be refined and tested to ensure they met the National Construction Code (NCC). The tiles and surfaces were stain-tested with substances like red wine, soy sauce and lemon juice over many days, as well as being assessed for fire resistance, slip resistance (in the case of the floor tiles), surface 'touch' and aesthetic appeal. Veena knows that "a product doesn't just have to look good; a product has to perform", but she's also aware that seeing is believing when it comes to changing the mindset of an industry and the general public. "People have got to be able to have a look," she says. "Ultimately people want to see things in operation, to touch and feel the products." This makes the Pavilions display apartment a vital step in broadening community acceptance. "Every little bit, every little conversation, every little demonstration, helps people change," Toby acknowledges.

This is not the first project for Mirvac and the SMaRT Centre. They first collaborated to produce furniture and artworks to highlight the One Planet Living principles at Mirvac's Marrick & Co development in Sydney's inner west. The pieces included chromatic artworks and a blue dining



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A striking sculptural piece of wall art displays the wide variety of 'green ceramic' colours that can be manufactured, determined by the colour of the recycled textiles used.



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When the pendant lights above the kitchen bench are lit, the glass components in the ceramic sparkle. 'Green ceramics' were also used for the splashback, bench front and tabletop.

table made from waste glass and a donated designer dress, and occasional tables made from waste glass, fabric and corflute posters that had been used to promote events at UNSW.

Following a great response to Marrick & Co, the next question was how to integrate recycled elements into the building itself. Initially, the Pavilions apartment was just going to include green ceramic tiling on one part of the kitchen floor, "but then it looked so good we did the whole living area," says Toby. The project grew to include all the recycled elements now in the demonstration apartment, as the SMaRT Centre used the opportunity to push their design capabilities and expand their product range.

Mirvac is exploring next steps in its collaboration with the SMaRT Centre but in the meantime, designers, builders and homeowners can contact the centre directly about buying green ceramic tiles for their next project. Buyers can set out their specifications via the centre's website and the tiles will be manufactured at the Kandui factory in Cootamundra, about four hours south-west of Sydney.

Moving forward, it will be vital to ensure that recycled construction materials are compliant with industry standards and NCC requirements and produced to a high level of quality and consistency. Guaranteeing a regular flow of waste materials and engineered outputs will be crucial to making the products commercially viable, and should also decrease costs and increase industry uptake. Seed funding and government incentives can help make MICROfactories and small recycling concerns feasible, and legislation and regulation can drive industry responsiveness (although Toby warns these should be used sparingly). Veena praises the efforts of early adopters among consumers, local governments and businesses, as they can encourage the change of public sentiment that is needed to

make people more likely to embrace a recycled option.

And finally, both Veena and Toby emphasise the importance of their strong research/industry collaboration. As Toby puts it, "Veena's great at knowing what she can do, and we're great at presenting things to a market." Just the partnership needed to bring a circular economy closer to reality. 🌱

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The off-white tiles for this backlit feature wall were manufactured using glass and jute coffee sacks.

