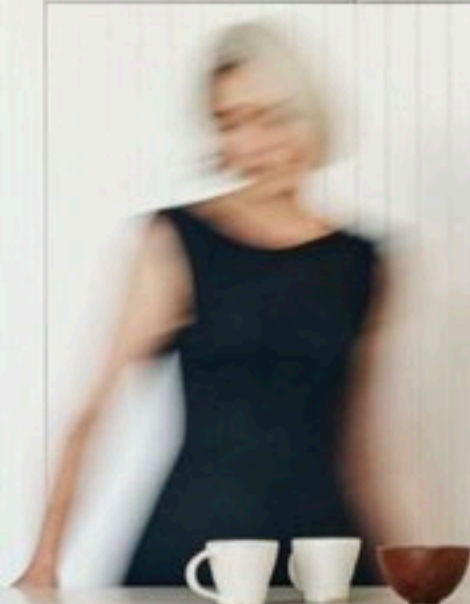


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**T**he overlooked plot that Marc and Felicity Bernotring-Husmann ended up building a house on was deemed unfit for construction use by their local council in Australia. But what started life as a wedge-shaped piece of derelict wasteland – situated next to a 10-storey apartment block, double-storey housing site and a busy train line in Coburg, Melbourne – has been transformed by the couple into a modern passive house.

The Passivhaus was originally developed in Germany in the 1980s by Dr Wolfgang Feist, a physicist, and Professor Bo Adamson, a construction expert, who were inspired by medieval dwellings built in Iceland. The concept is underpinned by five guiding principles: airtightness; thermal insulation; mechanical-ventilation heat recovery; high-performance glazing; and thermal-bridge free construction. These eliminate the need for artificial heating or cooling systems. Taken together, the guiding principles meet the rigorous requirements of the International Passive House Association.

German-born Marc and Felicity, who studied architecture before moving to Australia, have created a working prototype for a new generation of passive house – Hilt 01 Coburg – to be created under their brand Home by Hilt. Designed as both an experimental case study and a home for the couple and their three children Anna-Lena, 16, Leon, 12, and Joshua, 10, the house showcases their passion for sustainable and contemporary design and for regenerating smaller spaces of derelict urban land. The idea of the passive house has been gaining traction in Europe and the UK, but in Australia it is still relatively new, with fewer than 50 houses certified.

"Passive houses offer a new way of living with incredible environmental benefits and substantially reduced power costs," says Felicity. A constant 19C to 21C is maintained indoors despite temperatures that drop in Victoria to below 5C. "We are passionate that innovation is combined seamlessly with luxury, wellbeing and beauty. There does not need to be a visual compromise."

The all-electric house, accessed via a blue stone laneway, was modelled initially in 3D to consider the impact of every detail: the orientation to the sun to maximise solar-heating gain; cross-ventilation to flush out heat in the summer; the introduction of cooling through-breezes from the moist, shaded rainwater garden that connects to the main living area, and staircase skylights to act as a chimney against overheating.

The house is built on a concrete slab that's continuously insulated to prevent heat transfer (thermal bridging) where the slab meets the walls. Wood-fibre insulation stores carbon, mitigates thermal bridging and is breathable – unlike conventional polystyrene insulation that can collect mould and condensation. The walls and roof are built with prefabricated cross-laminated timber (CLT) and take a week to erect, with noise-reducing, carbon-storing and



Getting the hang of it: (clockwise from top) the kitchen features black-stained American oak and marble surfaces; a hammock and hanging net in the tranquil haven of Anna-Lena's bedroom; a brass washstand designed by Felicity; and the dining area with its Ethnicraft table

**'A connection with nature inside and out is important to us. Living biophilic walls increase a sense of wellbeing'**



insulating properties a given. The small internal footprint works incredibly hard, and the steep pitched roof creates space in the children's bedrooms, with mezzanine beds above areas for play, study and relaxation. The capacious feel is embellished by heavy-duty nets just above head height in the bedrooms and at the top of the stairs, which optimise space. On the ground floor, thoughtful spatial planning has created distinctive zones for cooking, eating and relaxing – neutral, calm spaces that have a timeless appeal. The sunken-lounge flooring is a bespoke concrete mixed with recycled aggregate. Like terrazzo, it adds a refined touch and complements the marble and wood used in the kitchen – another bespoke design by Marc and Felicity. All storage is located on the ground floor, hidden behind black-



stained American oak units and artfully worked into wardrobes, cupboards, a study nook and under-seat cavities.

The laundry room and bathrooms feature bespoke details: curved surfaces, a brass washstand designed by Felicity and high-end sanitaryware.

Unexpected design touches delight at every turn – light-induced patterns streaming into the stairwell from west-facing open exterior brickwork that offers a low-level sneak peek into the house; a garden window handpainted by Anna-Lena, and secret doors and passageways connecting the children's bedroom spaces.

"A connection with nature inside and out is important to us," says Marc. "Living biophilic walls enhance the ventilated air quality, eliminating allergens and increasing a sense of wellbeing." A quirky bridge suspended over the courtyard connects to the roof garden planted with native grasses and dichondra, and a quiet rain garden which collects water that runs off the green roof. In the main garden stepping stones lead you to a wood-fired barbecue area, a goldfish pond – which irrigates a vertical kitchen garden – and a circular wooden deck area.

This house is living proof that building a sustainable home can be compatible with an urban location and a small footprint. As climate change intensifies, quality over quantity will become an ever-important design goal. With Passivhaus technology supporting sustainable choices and enhancing a sense of comfort and luxury, one can't help but feel that this new generation of architecturally designed homes is the only way forward for building a better future. ■ [hilt.com.au](http://hilt.com.au)



# FUTURE TENSE

A selection of homes expanding our sustainability horizons.

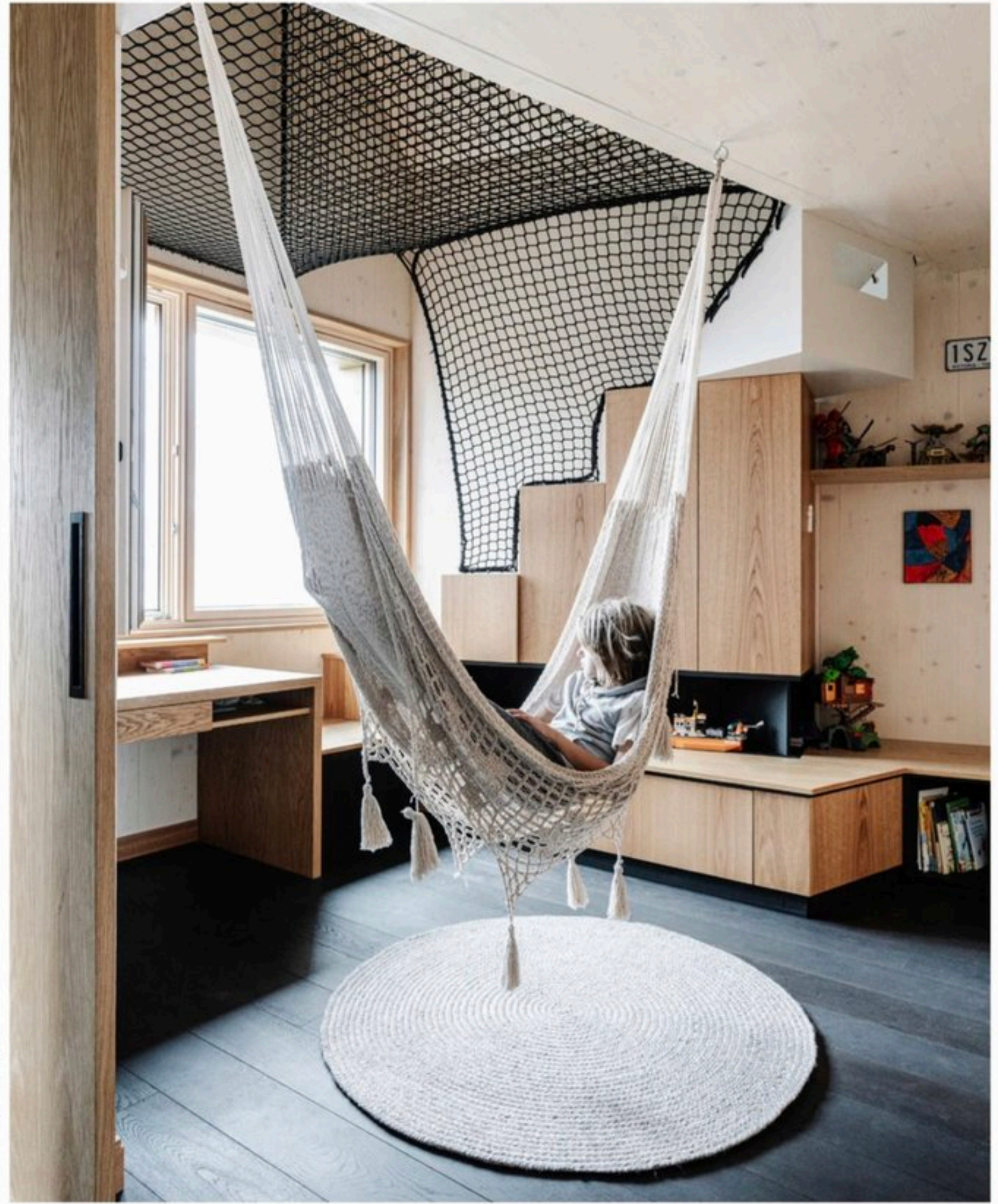
text: Kath Dolan



Robbie Walker's Mansfield House is an exercise in elemental exposure and snug protection. **opposite** The small footprint is augmented by suspended nets and hammocks, creating literal hangout space within generous volumes.

Photography: David Kulesza

Photography: Marnie Hawson







Photography: Marnie Hawson



## PASSIVHAUS

Hutt 01 Passivhaus in Coburg transforms a tricky block beside a train line into a four-bedroom family home owner-built by Melbourne Design Studio architects Felicity and Marc Bernstein. It's defined by ingenious, loving attention to detail at every turn.

The double-storey home is all-electric and is a certified Passivhaus. It features high levels of continuous insulation, an airtight structure, quality windows and thermal bridging and a heat recovery ventilation system creating a constant supply of fresh, filtered air which Marc describes as "the lungs and brains of the house." The latter draws in fresh air from outside, expels stale air from inside, and heats and cools the home using the energy created when they cross paths.

The house uses low-carbon concrete that delivers thermal mass at 70 per cent cement replacement. Timber-framed, triple-glazed windows and doors slide into triple-layered, airtight, floor-to-ceiling seals. The result is almost no heat loss or gain from outside and not a peep from passing trains. With a quick flick of a door handle, doors convert to hopper windows, from which warm air inside can be flushed outside naturally. Marc says that in their first winter there the family never switched on a heater.

Floors, walls and stairs are made from strong, sustainable cross-laminated timber (CLT). This structural core of CLT forms part of a layered approach to insulation that includes building paper to prevent air infiltration, a layer of wood pulp, more building paper, timber battens and the home's metal façade. No wonder this place seals tight as a drum.

With an internal footprint of just 78 square metres, this clever home may have felt cramped were it not for the generous volumes, abundant light and biophilic natural timbers and lush plants. Suspended nets provide unexpected pockets to play, rest, read and linger.

At the rear, the house opens to a gorgeous, expressive garden. It's a naturalistic design with a large fishpond and a small, round timber deck suspended over part of it. There's lovely indigenous planting and an aquaponics system that pumps through a vertical edible garden, providing nutrients for food and fish alike. The entire space is enclosed in brickwork inlaid with a stained glass window designed by Felicity and Marc's daughter. Tucked away down a typical bluestone lane, this atypical beauty delights from head to toe.

[melbournedesignstudios.com.au](http://melbournedesignstudios.com.au)

**left** Lovely light, views and greenery enhance the small spaces. **right** Though tightly sealed, this Passivhaus opens expansively at the rear to a verdant garden. **opposite** The lush garden uses a fish pond and an aquaponics system pumped through a vertical edible garden to share nutrients with fish and food.