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1 The house in Melbourne's inner north was designed with a curved roof to minimise any overshadowing for Elizabeth and Rodney's neighbours to the south.



Leading edge

A 9-Star house in Melbourne raises the bar, environmentally and socially.

WORDS Sasha Shtargot
PHOTOGRAPHY Emma Cross

WHEN ELIZABETH WHEELER AND HER PARTNER RODNEY

Vlais set out to build a sustainable home in suburban Preston in Melbourne's north, their new house was always going to have that extra edge. From the outset theirs was an ambitious project aimed at high levels of sustainability, ultimately achieving a 9.1-Star energy efficiency rating. However, the couple also wanted to incorporate social ethics into the design of their home.

Concerned about the overshadowing their north-facing two-storey home would cause, they chose a distinctive curved roof which would allow their southern neighbours as much sun as possible. They also ensured their design would work well with the home their friends are planning for the block to the north, allowing for a communal garden and outdoor play space.

The 180 square metre house, designed by Positive Footprints, makes use of passive solar principles. Elongated on an east-west axis it has double glazed, low emissivity coated casement windows and eaves that allow for deep sunlight penetration in winter and shade in summer. Thermal mass is provided by a low embodied energy polished concrete floor and reverse brick veneer walls made of recycled bricks. Elizabeth explains that using recycled bricks was important because using virgin materials for thermal

mass often results in a net energy loss for the environment. Reverse brick veneer (RBV) is a construction technique in which the bricks are on the inside of the wall; in the case of Elizabeth and Rodney's home, the outside is insulated and variously clad with radially sawn timber, plantation pine plywood and corrugated steel. [Ed note: for more, see our article on RBV in *Sanctuary* 17.]

The design of the house also incorporates paths for cooling breezes. North- and south-facing windows are aligned to channel cool summer breezes through living areas, voids above the ground floor living room and bathroom allow air to move upwards and internal louvre windows also regulate circulation. The house is highly insulated and care was taken to ensure a draught-free building fabric.

The couple also installed a 3 kilowatt solar photovoltaic system and an evacuated tube solar hot water system with instantaneous gas boost. Two 2500 litre rainwater tanks are connected to the toilet and laundry. Rainwater is also used to water the garden, along with a greywater gravity diversion system that feeds water to the mini orchard. On the health front, zero volatile organic compound (VOC) paints and minimal off-gassing cabinetry and trims were used throughout.

At first light

A New Zealand house has achieved international recognition but its purpose is largely local: to encourage sustainable living in the “Land of the Long White Cloud”.

WORDS Verity Campbell
PHOTOGRAPHY Ron Blunt

LATE LAST YEAR 27 UNIVERSITY STUDENTS FROM VICTORIA UNIVERSITY of Wellington set out for Washington D.C. Their journey had been two and a half years in the making.

The team had been selected as one of 20 finalists – the first ever from the Southern Hemisphere – to take part in the US Department of Energy’s Solar Decathlon. Held biennially since 2002, the Solar Decathlon is an event designed to inspire and inform participants and the wider public about the benefits of building green. Staged over ten days in the National Mall’s West Potomac Park near the White House, the free event attracts over 300,000 public attendees.

To reach the finals, the team, supervised and supported by university staff, had to design and build a home that would achieve best practice energy efficiency – essentially a net zero energy house that would make as much or more energy over a year than it needs to run itself. The house also had to be built to a realistic budget and be deemed attractive to market.

To have even attempted such a task, let alone make the finals, would have been commendable. But the hurdles didn’t end there. If they were chosen for the finals, the team would need to find funding for the manufacture and transportation of the house through product and marketing partnerships – no easy feat.

The team was comprised of students from a range of disciplines, including architecture, engineering, landscape and interior design, and communications, marketing and visitor management.



Windows, doors and the skylight are triple glazed with grey tint and argon gas fill. The large windows have manual roller blinds and the skylight has automated blinds for additional shading and improved insulation.





Straw bale: an enduring building technique

Whether you're planning a sleek or rustic-looking house, straw bales are a low cost and sustainable building material with flexibility, writes Paul Downton.

WORDS Paul Downton

What has an accredited fire resistance of two hours, is more resistant to vermin and rot than most timber, and provides insulation values that comfortably exceed the most stringent demands of the building code? The answer is rendered straw bale – and as a sustainability bonus, when the building's life is over, most of its walls can be turned into mulch.

THE RISE OF STRAW BALES

Straw bale building has been around for over a century. The oldest surviving buildings date back to the early twentieth century, when pioneering farmers in the Nebraska Sandhills facing a dearth of trees found the local soil made poor building material. The most famous historical example of a straw bale building is a church, built in 1928, listed in the US National Register of Historic Places – it is still in use today.

The modern straw bale movement dates from the early 1980s, when the rediscovery of bale building was fuelled by renewed interest in ecological building. In the early 1990s a book called *The Straw Bale House* by Athena Steen, Bill Steen and David Bainbridge became a manifesto for the growing movement towards healthy, affordable, environmentally responsible building.

Straw bale buildings range from tiny houses to large commercial facilities and their appearance ranges from slick to rustic. Straw bale structures can be built onto existing buildings and joined to other construction systems. Walls can be finished as smoothly and evenly as a concrete wall or as lumpily as rough stonework; corners can be sharp arrises or smooth curves. A straw bale house can look “alternative” or blend in completely with neighbouring suburban properties.

Internationally, straw bale buildings like the Austrian S-House meet the “Passivhaus” standard – the highest accredited energy performance rating in domestic construction. [Ed note: see *Sanctuary 17* for more on the Passivhaus (Passive House) standard.] In Australia, most straw bale buildings are individual dwellings and owner-built, but straw bale buildings also function as community facilities, eco-tourism developments, wineries and educational buildings. These include the Australian Wildlife Hospital in Beerwah, Queensland, the Adelaide Zoo Environmental Education Centre, major winery buildings (some built using jumbo bales), eco-villas in South Australia's Flinders Ranges, the Hall of Conciliation in Ganmain, New South Wales, and houses ranging from huts to mansions.

The mainstream building industry is beginning to recognise the material's value as a general purpose, high performance building medium.

Most straw bale buildings use the bales to create thick infill panels in timber or steel framed structures and rarely use the bales to take any major structural loads. However, straw bales can be used like giant bricks to not only support their own weight as they do in framed construction, but also roof structures as they did in the old Nebraskan examples. Used in this way, there are more design limitations (particularly on the size of windows and other openings) than when major loads are carried by structural frames.

BUILDING WITH STRAW BALES

Straw bales weigh about the same as five or six conventional bricks. In a typical domestic construction they are stacked in a similar way to brick walls around a structural frame, all secured to a concrete slab. They are sometimes pinned through with vertical metal or bamboo rods but are invariably compressed after stacking – usually with high tensile wire that wraps around the height of the wall or at every six to seven bales high. Trimming, cutting and shaping is done with a chainsaw. A wire or perforated

Nature and nurture

An old fish and chip shop and flat on Tasmania's southern coast has been transformed into an inviting business and home with green credentials – and it's making a remarkable impression.

WORDS Rachael Bernstone
PHOTOGRAPHY Jasmin Latona



↕ Extensive joinery in salvaged Cypress Macrocarpa provides plenty of storage and display space in the shop, and a light well above the entrance airlock boosts natural light. The pressed metal ceiling is new, and was chosen to tie in with many other shops and street canopies in the town.



WHEN JOHN AND KATE REED DECIDED TO MOVE TO

Tasmania for lifestyle reasons, they didn't expect the process of shifting their business and family to be such an enjoyable or enriching one.

The couple sold their pharmacy in the Sydney hills to concentrate on their other venture: manufacturing and dispensing homeopathic remedies. Predominantly a mail order business, it was straightforward to relocate south to Cygnet, where the Reeds acquired an old shop on the town's main street with a rundown flat behind it.

The existing building was double brick in the shop and brick veneer behind, with a timber framed metal clad roof. As one of the larger retail frontages in Cygnet, it had a prominent place in the community and offered much potential, but there were some drawbacks too. "The flat was colder inside than outside, but we wanted to make it liveable and warm without resorting to excessive power bills," John says. They approached local architect

Ryan Strating of Core Collective to renovate the shopfront for the business and the flat as a residence until they could build their "dream home" – currently being designed by the same team – nearby.

With the two-storey Cygnet Town Hall next door to the north-west, the building had little access to northern sun so the new design involved re-pitching the roof above the flat and installing highlight windows along the northern side to bring light and warmth into the open plan living area. Along with an extensive refit, including new joinery, new flooring and the conversion of the former takeaway's old kitchen into a laboratory, the result is a welcoming retail space with a dispensary, lab and three storerooms, and a compact two-bedroom flat opening to a north-east facing courtyard.

As Kate explains of those who enter the town's new store, "Invariably the first words are 'Wow! What a beautiful shop!' We have worked in retail 20 years and have never experienced such

Red brick renewed

A modest extension means this suburban Adelaide house works more naturally to keep its occupants comfortable, and has also inspired them to live more sustainably.

WORDS Sasha Shtargot
PHOTOGRAPHY Craig Parham



↳ The new pavilion was designed in an L shape with large east- and north-facing windows to catch the sun and make the most of views into the rear of the property.





↳ The extension is separated from the existing house with a glazed hall to create courtyards, where vegetation and water sprays generate evaporatively cooled air that can be drawn into the house.

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