

MODERN GREEN HOMES Sanctuary

INSIDE ISSUE 31 115+ green products and design tips; Integrated house & garden design; Living buildings; Choosing carpets; Perth's sustainable tech pioneer

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+
Tiny homes
Design on a budget
Salvaged for second life

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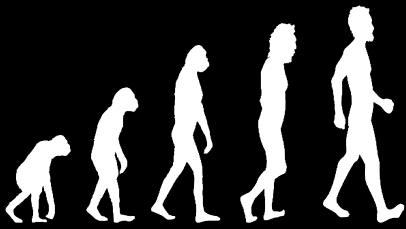
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... and then came the



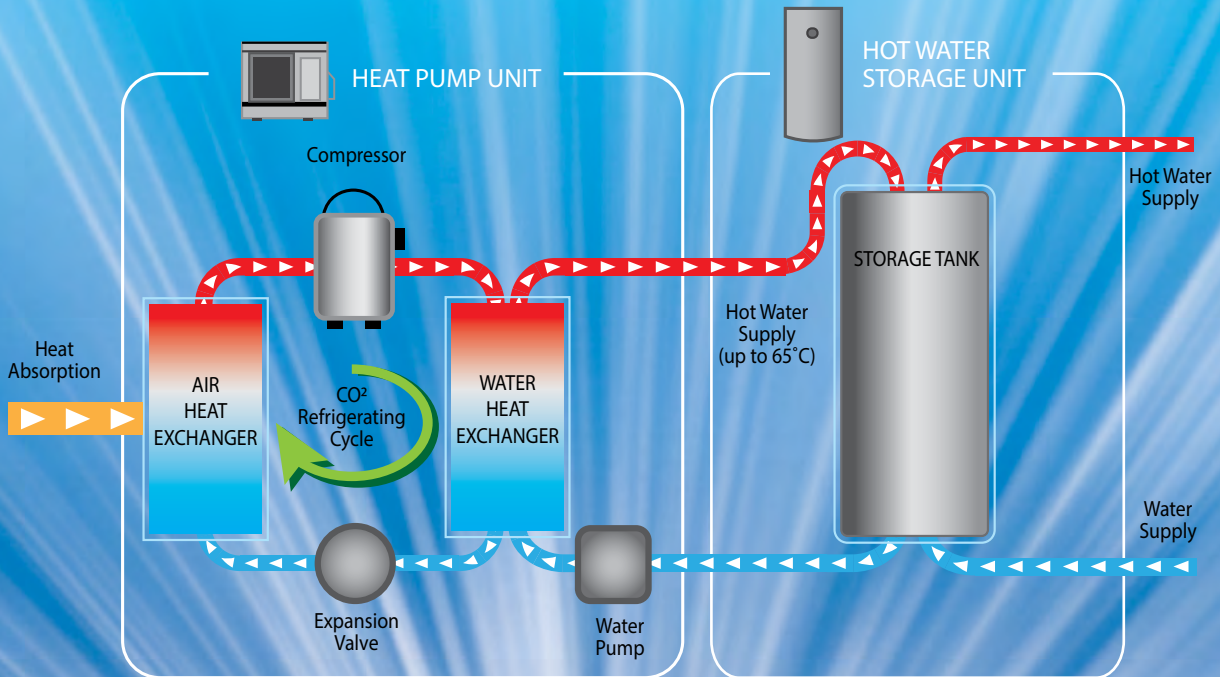
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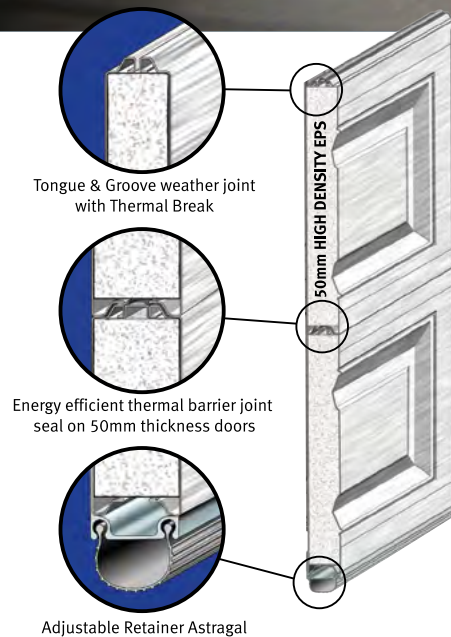
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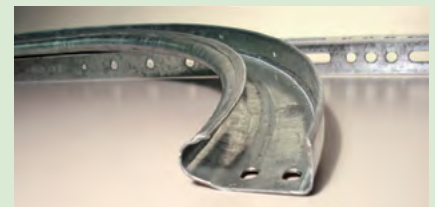
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SECTIONAL DOORS



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Home on a budget

Peter and Alison are looking towards retirement, seeking the good life and a new sustainable home in country southern Queensland. They have done their research and are committed to a low-budget, small-footprint home. Architect Stephanie Skyring offers a possible design solution.



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Letter from the editor

—Issue 31



Housing affordability is headline news around the world and Australia is one of the worst offenders. A genuine fix to this complex issue would require some serious overhauls, not just more houses. We don't profess to have all the answers here, but we do know that there needs to be more variety in the dwellings on offer to suit more than the idealised family unit.

While our home footprints are getting larger, the number of occupants in them is decreasing. According to the latest census, more than three quarters (78 per cent) of our houses are under-utilised – with more bedrooms than people. In this issue we consider a few housing models outside of the detached, family home in the suburbs, and how these could align with sustainable development goals.

For starters, we hear about the growing appetite for tiny houses in Australia, spurred on in part by the recently released *Small is Beautiful* documentary. We also dive into the growing array of modular and prefab housing options, showcasing some of the best sustainable models on offer. We also ask how varying degrees of shared living might offer environmental and social stability.

We are also inspired by the clever ways in which old materials can be reused or repurposed with entirely new results. Architect Emma Scragg visits two Queensland projects which have made creative use of other's discards for low-impact and characterful homes.

We hear about a challenging sustainability benchmark that addresses much more than energy efficiency, get some advice on making good carpet choices, and are urged to consider house and garden design as one by those working on the inside and outside of sustainable homes.

Then we head west to a new home by Chindarsi Architects, which is pioneering the latest in sustainable technologies, including ground-source heating and cooling; to Sydney for a modest addition to a family home; to Melbourne and a contemporary renovation to a heritage bungalow, and to Chewton in central Victoria where a whole house has been recycled to live out its days in heritage splendour.

As always, please let us know what you think. Send us your ideas, suggestions and experiences to sanctuary@ata.org.au or connect with us online: facebook.com/sanctuarymagazine @sanctuarymag.

Emily

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Reviews

—Film, books, apps, websites and other interesting stuff

If you have recommendations for films, books, smart phone apps, blogs, websites or anything else you think would be of interest we'd love to hear from you. Email us at sanctuary@ata.org.au



SMALL IS BEAUTIFUL: A TINY HOUSE DOCUMENTARY

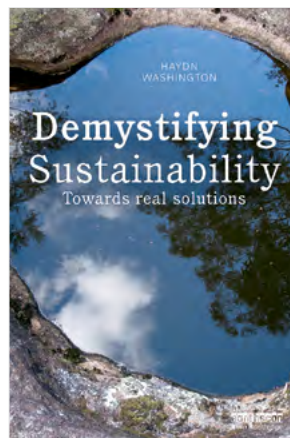
Directed by Jeremy Beasley

There's something alluring about the idea of a tiny house; going off the grid, paring down possessions and building a minute, but complete abode of your own. *Small is Beautiful* documents the lives of four people at different stages in their own tiny house journeys. Twenty-something Ben is spending his inheritance on materialising his design, while Nikki and Mitchell are idealists, hoping to get in touch with their nomadic roots. Fifty-year-old Karen has been living in her tiny Oregon house for two years, and is working on growing the tiny house network around her.

Far from glorifying the quaint idea of living little, *Small is Beautiful* truthfully portrays the strains of designing, building and then adjusting to life in a tiny house.

Sanctuary was a media partner for *Small is Beautiful's* Melbourne premiere.

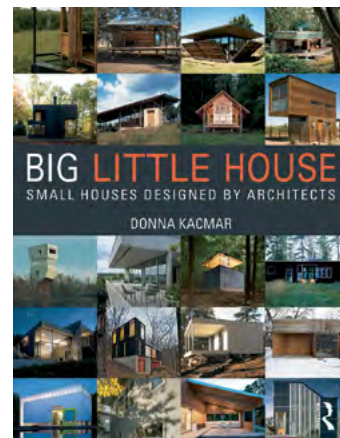
smallbeautifulmovie.com



DEMYSTIFYING SUSTAINABILITY: TOWARDS REAL SOLUTIONS

Haydn Washington
Routledge, 2015
\$61.99

Haydn Washington's latest book details some uncomfortable truths about overpopulation and overconsumption in an effort to recapture the urgency of a sustainable approach. However, *Demystifying Sustainability* takes a considered approach as it dissects the misconceptions and jargonisation of sustainability to restore meaning to this necessary and often misunderstood idea, putting forward nine real-world resolutions for change. While the ideas are made translatable and accessible, academic rigour doesn't suffer as a result as we are urged to move past denial to ensure our future.



BIG LITTLE HOUSE: SMALL HOUSES DESIGNED BY ARCHITECTS

Donna Kacmar
Routledge, 2015
\$49.95

Architect Donna Kacmar looks at twenty very different dwellings all less than 100 square metres in size. *Big little house* considers the difficulties of designing for limited dimensions in a time when bigger is considered better. While each small house takes a different approach to the use of materials and design principles, they are alike in their all-encompassing focus on light and minimalism. With full-colour illustrations, floor plans and interviews with the original architects, this book offers plenty of inspiration and advice for going small, whatever the motivation.



APPS



THE GARDEN PLANNER

www.thegardenplanner.net.au/ipadapp
iOS; from \$3.79

The Garden Planner is filled with seasonal gardening advice and planting guides. It sends you helpful reminders about caring for your green space, such as when to fertilise, and harvest – or cut back. The app also comes with specific information about the weather trends of your area and tips for which plants fare best in local conditions. With a further subscription, it is possible to map your garden beds and create a detailed garden journal.



RECYCLE RIGHT

www.recycleright.net.au/download-our-app
iOS, Google Play; free

Many councils have created their own recycling apps, tailored specifically for local householders and services. Recycle Right is one example, a creation of Southern Metropolitan Regional Council in Western Australia, which has useful tips on recycling and reducing food waste, and includes the toxicity levels of various waste products. With a database of common household items and how they should be recycled, as well as an ever-expanding list of recipes for leftovers, Recycle Right is a simple but effective app.



WEBSITES



PORT PHILLIP COUNCIL'S MY CLIMATE

thermalweb.it.csiro.au/arcgis/myclimate

Created by the CSIRO for Port Phillip Council, My Climate's thermal mapping shows surface temperatures for homes in the area from aerial flyovers and temporary weather stations, supplying a starting point to best tackle your energy bills and carbon emissions. It won't provide a complete solution, but helps you identify your roof's solar energy and water capturing potential, plus heat loss and solar gain with its user-friendly locator device. For tailored suggestions on purchasing energy efficient or renewable solutions, direct advice would be needed (such as an ATA consultation, or by our Tankulator or Sunulator tools). While created specifically for the Port Phillip area, various councils are looking to better map the urban heat effect – ask yours if they offer a similar service.



JUST

just.net.au

Just is an initiative by the World Wide Fund for Nature to reduce the amount of packaging and harsh chemicals used in everyday products. The website has a number of short, quirky videos which demonstrate how to make simple and eco-friendly alternatives for everything from sunburn relief to shoe polish, with no need for a plastic container. Inventions include the salted grapefruit bath-cleaner, and cinnamon infused mouthwash.



DID YOU KNOW?



The two usual types of solar hot water collectors are flat plate units and evacuated tubes. Flat plate units are most common and have been well proven in Australia for over 50 years. Evacuated tubes, which work more efficiently in cold climates, are more common in Europe and China.

Crushed concrete can be recycled for economic and ecological savings. If demolition concrete is stored separately from other materials, a more useable product can be achieved from the crushing for recycling into new concrete.

Underground water tanks save on space and usually have greater catchment potential than above-ground tanks. However this requires excavation.

If a stand-alone power system is installed with a separate battery charger, it should be treated like an inverter.

Image courtesy of Steendyk.com



In the post

Write to us! We welcome letters on any subject, whether it be something you have read in *Sanctuary*, an experience you've had as part of the green design or build process, or a great idea you would like to share.

Please limit letters to 200 words. We can't guarantee we will publish all letters received and letters published may be edited for appropriateness, clarity and length. Email letters to sanctuary@ata.org.au with your name and the state you live in.

Dear Sanctuary,

We love getting your magazine. It is fantastic. It provides plenty of inspiration for rebuilding our earthquake-damaged city. I'm not sure that people in the North Island or Australia or elsewhere in the world are aware that we are still coping with the damage – physically, financially and emotionally. Many of us (including me) are still working through insurance issues and trying to reach resolution more than four years on.

It feels like we are turning a corner and starting to rebuild our city. I'm a structural engineer and have seen a lot of damage in the city. I'm hopeful that we can get people back into the central city – living, working and playing. Your magazine gives me hope that we can incorporate sustainable solutions into our new buildings. There is a massive opportunity here.

– Ann Mackenzie, Director, Build Green, NZ

It is sad to hear that the devastating effects of the earthquake are still being felt. New Zealand has a great history of environmentalism, and it would be wonderful if rebuilding efforts could indeed lead to some positive outcomes by calling on this knowledge. We would love to hear about any sustainable developments that can come out of it, and any other interesting projects by our New Zealand neighbours, so please do keep us in the loop.

– Emily, Editor

Dear Sanctuary,

I've just discovered your brilliant magazine. We live on Sydney's north shore in a 1950s weatherboard with no insulation, very poor indoor to outdoor flow and a terrible floor plan. We are on a lovely block in a great neighbourhood though, and are gathering ideas about how to rebuild. Your magazine is providing lots of food for thought. We want to end up with a house that is well-designed and efficient, with enough space for a growing family (but not a huge, wasteful 'McMansion'). We will anticipate your future editions with delight, particularly with respect to Sydney builders and designers we can use.

– Sophie

Great to hear that *Sanctuary* is helping to inspire you and give you ideas for making your house well-designed and energy-efficient! Let us know how you get on, we can all do with more examples to follow.

For suggestions on designers and builders for your area, check out our online directory, sanctuarymagazine.org.au/sustainable-design-directory

– Emily, Editor

FROM OUR FACEBOOK FRIENDS

In response to our question "What sustainable solution or change would you most like to make to your house?"

So many DIY upgrades that would help my '70s low-performing home: solar collector walls with ducted air supply from the cool end of the house, a flexible thermal mass system, targeted seasonal roof space ventilation, some shading and airflow upgrades...

– John

We're planning to hang a gate on the north-west side of our deck then grow beans and peas on it, for shade you can eat!

– Linda

Share your ideas, inspirations and examples of energy-efficient solutions and sustainable designs on our Facebook page www.facebook.com/SanctuaryMagazine and on Twitter [@Sanctuarymag](https://twitter.com/Sanctuarymag)

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Joe Chindarsi has used his own house in North Perth as an exemplar in sustainable design and technologies. The house sits on a 207-square-metre subdivided block, making use of the nature strip for raised veggie planters. It is self-sufficient for its power, with 5.9kW of grid-connected solar, with battery storage.

Leading by example

As well as being an architect, Joe Chindarsi is a pioneer of new technologies. His latest home in North Perth is an exemplar of modern sustainable design.

WORDS Rachael Bernstone

PHOTOGRAPHY Dion Robeson

ARCHITECT JOE CHINDARSI USES HIS own homes as an opportunity to explore the limits of possibility, and his latest iteration in North Perth is no exception. “When I built my first home for myself 12 years ago, I installed a small 1.4 kilowatt photovoltaic system that was leading edge at the time (it cost \$16,000 from memory),” he says. “With this home I wanted to continue that trend.”

The new house is on a subdivided block – just 207 square metres in size – but it feels expansive despite its dimensions, thanks to Joe’s bevy of architectural tricks. The ground floor comprises an open plan living space with high ceilings and upper level voids, and opens on to an outdoor courtyard. Using the same finishes for the floors and walls inside and out enhances the sense of space. Upstairs, two bedrooms

sit either side of a central living area, and all three rooms benefit from saw-tooth roof profiles.

“We used polished concrete on the floors – for thermal mass and to create an industrial-type feel – and the saw-tooth roof profile ties in with that aesthetic,” Joe says. It also performs multiple functions that help keep the house comfortable all year round: the saw-tooth windows can be opened to vent out warm air in summer, and they allow diffused southern light into the whole house, which minimises electricity consumption and protects the owners’ collection of art, which adorns the walls in every room.

As well as being designed with passive design principles at front and centre, the house has several technological add-ons





⬆
The striking North Perth home has a bevy of architectural tricks which create a sense of space and light, including the high saw-tooth windows which fill the house with southern light (while protecting the owners' art collection), capture south-east breezes and help vent hot air.

that enhance its sustainability credentials. The saw-tooth roofline is angled to the north and west faces to create a much larger viable surface for solar than a regular pitched roof, and is covered with panels that comprise a 5.9kW system. Joe also installed a battery array to store energy generated during the day for use overnight, though the house is connected to the grid for backup power.

The substantial solar system produces more energy than is needed during the summer months, and battery storage leaves something for cloudy days. "While on some winter days we may not produce enough, throughout the year, we should be energy neutral," says Joe.

The house also boasts one of Western Australia's first ground-source water to air air-conditioning systems, which reduces the consumption of energy required for active heating and cooling. "It was a little

pricey to install – probably four times the price of a normal air-conditioning system – but I take a longer-term view, and do things on principle," Joe says.

The system is much more efficient than regular air-conditioning because it draws from the year-round stable temperature of the ground, as opposed to the at times extreme heat of the outside air. It works the same way – but in reverse – for heating during winter.

Having lived in the house for nearly a year – Joe and his partner Andrew moved in as the build was concluding in June 2014 – they are more than satisfied with the overall comfort and thermal performance of the house through Perth's hot summer, and its low running costs to date. As such, Joe is an enthusiastic advocate of the pioneering technologies he's deployed, and is always keen to show off the house and its various systems to prospective architectural clients,



↻ An energy-efficient Bosch induction cooktop makes use of the house's 5.9kW solar array on north- and west-facing roofs.

↻ Kitchen cabinetry is Tasmanian blackwood veneer, with a brass mosaic recyclable tile splashback. Concrete was used for flooring throughout, both for thermal mass and an industrial feel.





Reverse brick veneer combined with lightweight timber-framed construction and phase change materials were used in the upper levels for thermal mass. Phase change material was also used throughout the ceilings to the upper level to limit heat gain. External parasol screens shade the summer sun on east and west sides at this level.

and others considering solar and ground-source energy.

“The more people take up ground-source energy, the more the price will drop over time,” he says. “I think the grid electricity generators will be in trouble as the price of batteries and solar power systems continues to fall – and ground-source systems become mainstream – because it will become much more affordable for people to make and store energy at their own homes, like we are here.”

After making such a significant investment – including time, money,

resources and human capital – to get the design and build just right, Joe and Andrew plan to settle in for the long term. “We take the view that we will be here for a while, but if we do sell it prematurely, the person who buys it will see the value in a small home that is highly specced and very sustainable,” Joe says.

“It’s not a home that would appeal to everyone – it’s not a typical family home – but it’s self evident that the things I’ve done mean lower running costs, negligible ongoing costs, and minimal maintenance. It’s an amazing lock-up-and-leave house.”

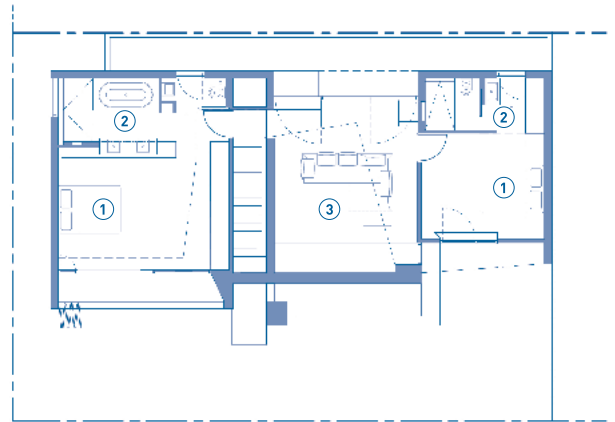
5

Joe is an early adopter of ground-source water to air air-conditioning, and expects it to provide up to a 50 per cent saving on running costs compared to a like-for-like air-sourced heat pump cooling system. It is comprised of three 70-metre-deep bore holes with closed loops that circulate water at the stable temperature of the earth of around 18 degrees Celsius. The water enters the heat exchange unit in the garage where it is used to efficiently heat or cool air via a heat pump for use in the internal ducted system.

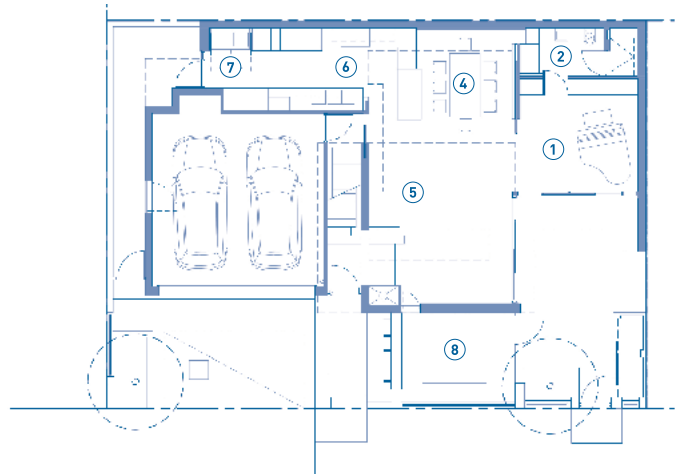


① The courtyard on the north-east corner of the house is sheltered from the weather, creating a warm and dry retreat in winter, and shade from the western sun in summer. The mature deciduous frangipani allows winter sun through the wide openings to the internal concrete slab.

FIRST FLOOR PLAN



GROUND FLOOR PLAN



LEGEND

- ① Bedroom
- ② Ensuite
- ③ Lounge
- ④ Dining
- ⑤ Living
- ⑥ Kitchen
- ⑦ Laundry
- ⑧ Courtyard

Chindarsi house

—Specifications

Credits

DESIGN

Joe Chindarsi, Chindarsi Architects

BUILDER

Castleprime Construction

PROJECT TYPE

New build

PROJECT LOCATION

North Perth, WA

SIZE

Land 207 sqm

House 240 sqm

BUILDING STAR RATING

8.5 Stars

Sustainable Features

HOT WATER

– Chromagen gas-boosted solar hot water system with 300L storage tank, and Eternity G26 gas booster.

RENEWABLE ENERGY

– The house is self-sufficient for its electricity, with an AC-coupled grid-connected solar system. 5.86kW of solar panels on the north- and west-facing roofs feed electricity to the house via a Kaco Powador 6.0 TL3 5kVA inverter. A Selectronic battery back-up system powers the house at night. The 3.57kW array on north-facing roof was installed by Solar Backup, the 2.3kW BenQ array on west-facing roof installed by Wesglo Electric.

WATER SAVING

– A 22,500L Versatile Concrete rainwater tank underneath the driveway supplies toilet flushing, washing machine, garden taps and pool top-up.

PASSIVE DESIGN / HEATING AND COOLING

– House oriented for maximum solar gain despite block orientation, with wide openings on eastern and some on northern side, coupled with concrete slab for thermal mass

– High level windows to south capture cooling breezes from the south-west and allow hot air to naturally vent out via stack effect

– Issey ‘Vertiroll’ ST motorised and hardwired retractable tensioned screen external parasols provide shading and privacy

– Other windows have laser-cut screen and wide overhangs

– Saw-tooth windows can be opened to vent out warm air in summer, and allow diffused southern light into house.

ACTIVE HEATING AND COOLING

– Ground-source water to air air-conditioning unit is a Water Furnace, 7 series 15kW with Rehau PE XA Probe loops, installed by Subthermal Solutions

– Boffi Air ceiling fan in master bedroom.

BUILDING MATERIALS

– Reverse brick veneer external walls and concrete slabs optimise thermal performance in Perth’s temperate climate

– Double-layered insulation installed under roof sheeting and over ceilings, and additionally within framed walls and masonry cavities: CSR Bradford Gold Hi Performance Wall Batts, R3.0, to all external light-weight stud-framed walls; CSR Bradford Enviroseal wall wrap reflective wall sarking to underside of metal deck roof sheeting; CSR Bradford Medium Duty Anticon 55 building blanket reflective foil/glasswool insulation, R2.6/R2.1 to underside of metal deck roof sheeting; CSR Bradford Gold Hi-Performance Ceiling Batts, R5.0 to all ceilings underneath roofs; Kingspan Kooltherm K10 FM rigid Soffit Board insulation, with reflective foil facing, R1.43 within double-brickwork cavities to external walls

– BioPCM Mat 25 phase change material was also installed over all ceilings under roofs, acting

as additional thermal mass within the ceiling to further assist in diurnal temperature stabilisation

– Timber screens made from reclaimed WA jarrah salvaged from Joe’s grandparents’ old home, which was demolished.

WINDOWS & GLAZING

– Double-glazed thermally-broken frames with low-e argon-filled interlayer joinery sourced from Casver.

LIGHTING

– LED strip lighting and Darkon Wynn Trimless fittings in walls from Lighting Options Australia; DeltaLight Heli 1 Screen LED step lights from Inlite; DeltaLight Femtoline 25 LED profile lighting; Brightgreen W200 Cube and W900 Cube wall lights; Fractal Cloud Pendant by Luxxbox; Solid FSC oak pendant by Ross Gardam; TOPAZ pendant lights by Edward Linacre via workshopped.com.au.

PAINTS, FINISHES AND FLOOR COVERINGS

– Dulux Wash and Wear internally

– Dulux Acratex texture coatings externally

– Venetian polished plaster Marmorino finishes.

OTHER ESD FEATURES

– Sub-soil irrigation for further water-saving

– Raised food gardens make use of the wide verge

– The home sits on a compact 207 sqm subdivided block

– High-efficiency rating appliances including a Bosch induction cooktop.



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Low-carbon refresh

A lightweight, modest extension has transformed the living space of this inner Sydney house, and made entertaining much less awkward.

WORDS Verity Campbell

PHOTOGRAPHY Thomas Kayser

LOUISE AND JOHN HAD BEEN LIVING IN their Federation home with its pokey 1970s lean-to for 14 years when they finally decided enough was enough. It was time to end the frosty bathroom winters and the need, when guests came over, to pull the table into the centre of the room right next to the bathroom. “You had to wait until everyone had moved into the lounge room after dinner so that you could use the bathroom in privacy,” recalls Louise.

It was time to replace the kitchen-dining-bathroom with something spacious, more energy-efficient and comfortable, tailor-made for entertaining.

The couple enlisted Sharon Hamilton and Darryn Parkinson from Your Abode to help them with their vision. As interior

designer, Sharon worked with Louise and John on the fitout. Having an expert assist with interiors wasn’t something they had set out to do, but it made a huge difference, says Louise.

Darryn’s task was to resolve the design challenges: most importantly, to accommodate the spatial requirements of the new structure while keeping the footprint of the addition small. He also needed to bring in natural light to the south-facing addition. His solution was to create a lightweight addition with an ensuite and walk-in robe connecting back to the original part of the home, and expansive open plan living, dining and kitchen opening onto a deck.

Despite the modest size of the addition,

at just 56 square metres, the home now “has a wonderful sense of space,” says Louise, “because we’ve got the large windows to look out and plenty of light coming in.” Lofty dual cathedral ceilings with north- and south-facing glazed gables draw natural light deep into the extension.

Alongside recycled flooring, low-VOC finishes, LED lights and other environmentally friendly features, the home benefited from some careful attention to detail. Insulation was installed underfloor – an area often overlooked – while all external windows and doors were weather sealed – another detail usually left to homeowners. Darryn also beefed up the insulation of the walls; instead of fastening the external Shadowclad cladding straight



Louise and John's new addition comfortably accommodates their dining table, rectifying a major inconvenience of the original home. A glazed, low-e north-facing gable above the kitchen permits solar gain, and ceiling fans with a reverse function help keep the living spaces at a comfortable temperature year-round.



← From the street, the 1.5kW solar PV system gives a hint of this renovated Federation home's new eco credentials.

→ The new kitchen features water efficient tapware, Greenguard certified Corian benchtops and E0 low-VOC materials for the cabinet joinery, with blackwood veneer. An east-facing window floods the space with morning light.



onto the timber framing, he first fixed it to timber battens, allowing the walls to ‘breathe’ more easily, meaning moisture doesn’t get trapped. It can also increase the wall’s R value by up to 0.5. “It’s a good option for lightweight construction like this,” says Darryn. “There’s only so much room for insulation, but with this method you can make the walls work harder and be healthier without needing to stack in more and more insulation.”

Your Abode commission a Life Cycle Assessment (LCA) for many of their homes. A building LCA looks at the embodied carbon in a new build or renovation over

the life of the building, comparing it with equivalent ‘standard’ homes. It looks at what goes into the home to build it, and what impacts these choices make operationally over the life of the home. An LCA includes data on materials, waste, transport, energy use and end of life management. The LCA findings for Louise and John’s home showed that its embodied carbon was 291kgCO₂e (kilograms of carbon dioxide equivalent) per person per year – a saving of 65 per cent compared with a ‘standard’ home. This is mostly due to the reuse of as much of the original building as possible and the use of lightweight

materials. The building’s operational carbon, which includes how much cooling and heating the home will need, came in at 1624kgCO₂e per person per year – a saving of 46 per cent.

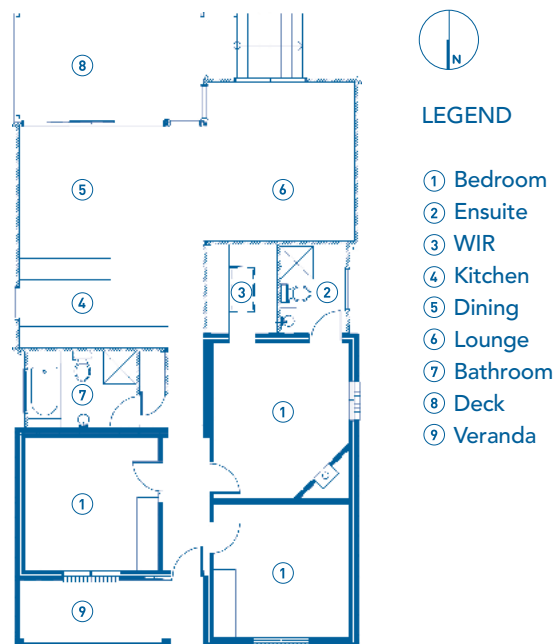
For Louise and John these figures translate into a comfortable home year-round, with the satisfaction of having minimised their carbon footprint. Louise estimates they’re paying about the same on their utility bills as they were before the addition – despite the increase in utility prices and in the size of the home. And now, they have a table that can extend to sit 12 – with no bathroom doors in sight. 5



John and Louise found that having an interior designer on the team was particularly useful when choosing kitchen and bathroom components. Bathrooms feature 4 to 6 star WELS-rated efficient tapware.



FLOOR PLAN



West Ryde

—Specifications

Credits

DESIGN

Your Abode

BUILDER

Your Abode

PROJECT TYPE

Renovation

PROJECT LOCATION

West Ryde, NSW

Sustainable Features

RENEWABLE ENERGY

- Kyocera 1.5kW photovoltaic system.

WATER SAVING

- Two 3000L rainwater tanks collect from the entire roof area and water is filtered before being used in toilets, laundry and garden
- All gutters are leaf-screened to maintain water quality
- 4 to 6 star WELS-rated toilets, water fixtures and appliances
- EcoVerta diverters in bathrooms divert the initial cold water in hot water pipes to the rainwater tanks
- All hot water pipework has been insulated in excess of Australian Standard minimum requirements.

PASSIVE DESIGN / HEATING & COOLING

- Lofty dual cathedral ceilings with north- and south-facing glazed gables draw natural light and warmth deep into the extension
- Carefully designed eaves prevent heat gain in summer whilst allowing solar access in winter
- Insulation levels within the walls, roof, ceiling and floor all exceed minimum requirements
- External cladding has been fixed to cavity battens, providing an additional insulating layer within the wall system and improving the thermal performance of the external envelope
- All external doors and windows have been fitted with seals to ensure a tighter building envelope.

ACTIVE HEATING & COOLING

- Fanco Urban 2 ceiling fans in all living spaces have a winter setting which reverses the direction of the fan, aiding in winter heating
- Existing small split system air-conditioning unit retained for the new addition.

BUILDING MATERIALS

- Kingspan Kooltherm underfloor insulation with a total R value of 1.8
- Reclaimed Australian hardwood for flooring, deck, structural beam and pergola
- Many items from the previous house recycled into new house; e.g. salvaged blackbutt flooring was crafted into vanity and wall cabinet units
- External cladding is Shadowclad plywood, manufactured from plantation grown pine; the layout was designed to work to full sheet sizes where possible to reduce material wastage
- Recycled bricks have been used for the piers and recycled hardwood for the bearers and joists underneath the addition, reducing the environmental impact of the addition
- Kitchen cabinetry and joinery made with Laminex E0 low-VOC boards
- Corian benchtop chosen for Greenguard certification.

WINDOWS & GLAZING

- High level, low-e gable glazing means no artificial lighting is required during the day
- Well-placed windows and doors harness cooling summer sea breezes for cross ventilation

- Viridian low-e glass, which has an efficiency improvement of 20-30% over standard glass, with custom-made frames for all windows and doors
- Custom recycled hardwood slatted screen external shading fitted to over-exposed west-facing windows, reducing heat gain in the hotter summer months.

LIGHTING

- LED (including Brightgreen) or contemporary fluoro lights throughout.

PAINTS AND FINISHES

- Low-VOC Murobond Pure paint used for walls and ceilings
- Low-VOC Murobond Murothane clear finish used on internal timberwork
- Synteko Natural zero VOC floor oil used on timber floors
- Blackwood veneer kitchen cabinets finished with Briggs Veneer water-based polyurethane.

OTHER ESD FEATURES

- The house has had a life cycle assessment undertaken of its embodied carbon impact, which has demonstrated a near 50% saving over a 'standard' house
- High energy efficiency-rated appliances
- An Efergy energy monitor has been installed in the house providing the users with real-time information on their energy usage.



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Recycled house

Relocating an original Brunswick cottage to historic Chewton allowed the perfect blend of old and new, and plenty of scope for creative reuse.

WORDS Emily Braham

PHOTOGRAPHY Calan Stanley

CALAN AND SARAH WERE KEEN TO LEAVE THE RAT race after 10 years in Melbourne. They settled on vibrant and community-minded Chewton, just outside Castlemaine and 110km north-west of the city, where land was relatively affordable and commuting was still a possibility. In the end their recently purchased Brunswick house, a historic but dilapidated double-fronted weatherboard, made the move with them.

As *Sanctuary's* graphic designer, Calan had no shortage of ideas when it came to building his own home, but one stood out. "The idea of recycling a house had big appeal," Calan says, "A, for heritage value and B, for the reuse." "It was tragic to think this 110-year-old-house - which we heard was built by the Brunswick Mayor - was going to be demolished," adds Sarah. "It was nice to think that we could give it another life." →





Relocating an existing house had big appeal for Calan and Sarah, A) for heritage value and B) for reuse. Here the first two of four sections of the house are loaded on to the back of trucks, leaving Brunswick for its new site in Chewton.



Calan and Sarah reused as many materials as possible in the renovation. Bricks from the original chimneys, which could not be transported with the house were used to make paths around the property.

Originally, the idea of relocating a house was about saving on building costs, but an opportune flow of events quickly gave it momentum. They spotted the characterful house marked for demolition around the corner from where they were living and decided “just to knock on the door,” laughs Calan. The sale was agreed soon after, and having already found a north-facing block on a quiet Chewton street overlooking bushland, there was no need to wait.

“It was pretty much what we wanted – an old Victorian house with a back that could be renovated to be north-facing, and it would fit in with the area,” says Calan. “We fell in love with it, even though looking back it was in pretty bad condition.” His carpenter brother and his father, an “over-engineering old-school builder”, enlisted as the project builders were less sure, “but

once we started working on it we found the original part was solid as anything and the timber joints were amazing.”

The period features that had won them over were lovingly restored, but not without hard work. Damaged during the move, the house had to be gutted and replastered. Nothing was wasted though, and even the stripped, broken-up plaster was used as part of the foundations for the driveway.

The new, slimmer plasterboard meant the original picture rail was too short for the renovated rooms, which were suddenly 50 millimetres bigger, so it was repurposed for the edging of the new pressed metal ceiling feature in the living room. The skirting boards were retained and extended to fit using excess from the third downstairs bedroom, which was converted to a separate toilet, bathroom and linen cupboard.

All doors were restored and reused, with the base of the door frames newly lined with period-faithful skirting blocks, handmade from old roof timbers. A creative collage and a striking lightshade were crafted with some of the original walls’ lath timber, with the rest stored under the house for future use.

A north-facing open plan addition to the rear replaces a shoddy 1960s renovation that “was a bit of a rabbit warren: it had a tiny lounge, a study and a kitchen all out the back,” says Calan. The previous owners had also made use of the attic, adding two bedrooms upstairs without pushing out the roofline.

Calan and Sarah agreed they didn’t need a four or five bedroom house, but wanted to retain the two levels. Architect Shae Parker McCashen of Green Sheep Collective



① The original Baltic pine-floored hallway leads past the old rooms to the new addition at the back and the stairwell to the right. Nothing was wasted during the restoration and renovation of the period home; even the old plaster helped make the driveway. The original ceiling cornicing hadn't survived, so a replica was applied to the hallway and the rooms, which all grew by 50mm thanks to the much slimmer modern plasterboard.

② The first two bedrooms and living room of the original house were virtually unchanged, though the fireplaces were replaced with in-built wardrobes when Sarah and Calan discovered the chimneys could not be used.





Materials are blended in the kitchen and dining room for a “real” finish. The bespoke plywood kitchen was created offsite to Calan’s detailed specifications after months of research, and the recycled timber table and kitchen benchtop were handcrafted by Calan’s father.

suggested the void mezzanine above the dining room, overlooked by the loft workspace and bedroom. “I’m really glad we went with the void”, Calan says. “People ask what it’s for, but it really opens up the upstairs area and lets in a lot more light.” It also acts as a thermal chimney, combining with high level louvre windows to help expel hot air at night.

“We wanted to keep the structural integrity of the house and its original expression, while allowing for plenty of light and a play of volume,” Shae explains. The wide north-facing openings and passive solar features of the addition create a deliberate separation between the old and the new. “We wanted people to experience this difference as they move through the house, but to create a smooth transition that wasn’t jarring.”

Second-life materials fill the addition, many with a story. “We didn’t want a sparkly kitchen, we wanted it to look real,” Calan explains. The hardwood floorboards once lined the historic Kyneton Auction Rooms, while an ill-fated Port Melbourne pub’s toilet doors were repurposed for the shed and the laundry. The dining table and kitchen bench were handcrafted from recycled timber. “We wanted it to be as sustainable as possible and limiting the use of new materials to absolute essentials was a big part of that,” Sarah says.

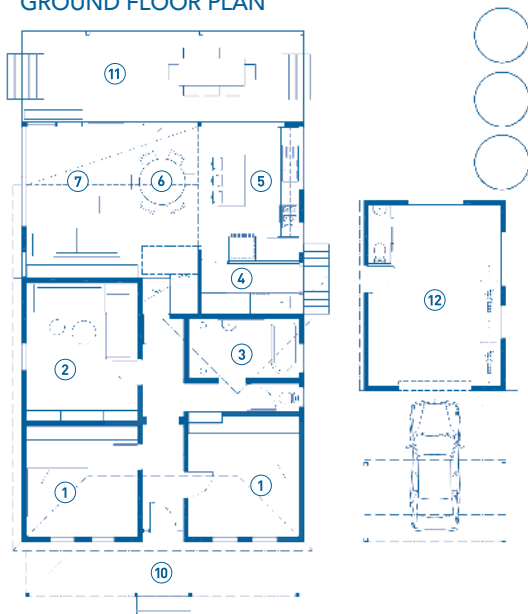
For Shae, it’s fitting that the historic cottage should begin its new life refreshed with an eclectic mix of reclaimed materials. “It’s the ultimate in terms of reuse – to think that it all could have ended up in landfill, but instead 90 per cent of it is living on in Chewton. It’s pretty amazing.”



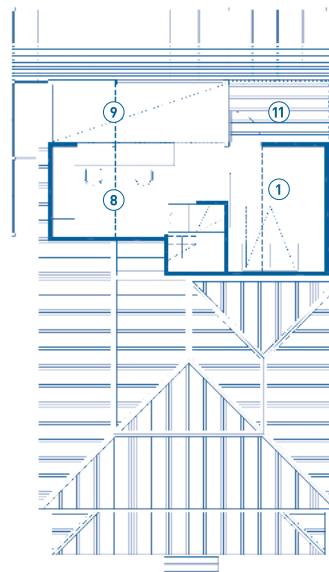


1 The modern northern addition and deck is clad in reclaimed blackbutt timber, and sits above recycled railway sleeper veggie planters. The mezzanine study and bedroom benefits from its own sunny balcony, a suggestion of Shae's. Temporary shading over the pergola will eventually be replaced by deciduous grapevines. The original bullnose iron roofing was used for wicking veggie beds.

GROUND FLOOR PLAN



FIRST FLOOR PLAN



LEGEND

- ① Bedroom
- ② Lounge
- ③ Bathroom
- ④ Laundry
- ⑤ Kitchen
- ⑥ Dining
- ⑦ Living
- ⑧ Mezzanine/study
- ⑨ Void
- ⑩ Veranda
- ⑪ Deck
- ⑫ Shed

Relocated house

—Specifications

Credits

DESIGN

Green Sheep Collective and owners

BUILDER

Owner builder

PROJECT TYPE

Relocation & renovation

PROJECT LOCATION

Chewton, VIC

COST

House transportation: \$80,000; renovation: \$200,000

SIZE

Land 1105 sqm, house 178 sqm

Sustainable Features

HOT WATER

– Rinnai Infinity efficient gas hot water system.

RENEWABLE ENERGY

– 3kW solar PV system with Enphase Energy M215 Micro Inverters, installed by EnviroShop.

WATER SAVING

– 3 x 7100L Polymaster tanks supply rainwater to entire house.

PASSIVE HEATING & COOLING

– North-facing double glazing to minimise heat loss through windows in winter
– Fixed shading over north and west windows designed to maximise winter and minimise summer solar gain
– Thermal chimney via louvre windows in mezzanine void
– Pergola with ornamental grapes over northern deck for summer shading.

ACTIVE HEATING & COOLING

– Thermarad classic hydronic panels throughout
– Ceiling fans in bedrooms and lounge and low energy Aeratron e503 ceiling fan in mezzanine
– External blinds provide shading to the north, east and west windows.

BUILDING MATERIALS

– Custom-made plantation hoop pine kitchen cabinets and doors by Plyboards
– Reclaimed timber used throughout including: blackbutt cladding, decking and kitchen benchtops from Urban Salvage and Timber Zoo; hardwood floorboards and jarrah front decking from Melbourne demolitions; original Oregon roof timbers were reused in the rear renovation walls
– Laundry and shed doors are reclaimed toilet doors from a demolished pub in Port Melbourne
– Knauf Earthwool insulation throughout: R2.5 in external walls, R2.1 underfloor and R4.0 in roof; Kingspan Aircell insulation in roof.

WINDOWS AND GLAZING

– Double-glazed doors and windows used on the renovated back half
– Custom-made louvre windows in void act as a thermal chimney.

LIGHTING

– LED lighting from Beacon used throughout.

PAINTS, FINISHES & FLOOR COVERINGS

– Wattyl Interior Design and Aqua Trim low-VOC paint used throughout
– Water-based floor varnish used throughout
– ‘Natural rustic’ sisal carpet from Floorspace used in upstairs rooms.

OTHER ESD FEATURES

– Recycled railway sleepers used in the native garden designed by Little Green Spaces
– Native plants sourced locally from Goldfields Revegetation
– Bricks from the three original chimneys reused for front and side paving
– Original bullnose roofing iron from rear deck used to make raised wicking vegetable beds
– Salvaged timber from Melbourne demolitions used for rear fence
– High energy rating appliances, including Miele induction cooktop.



Native landscaping, by Little Green Spaces, and reclaimed timber features surround the house on its western and northern sides.



Modular special

Modular and prefab construction cuts down on waste, time and money with factory-controlled production for guaranteed performance. What role does it play in sustainable housing?

WORDS Emily Braham and Anna Cumming

PIONEERED AS EARLY AS THE 17TH CENTURY, rolled out as employment for returned soldiers and post-war housing in Europe, and perfected in Japan for fast, cost-effective urban living, prefab housing is finally gaining traction in Australia.

Australia has been relatively slow to embrace the premade dwelling, but in its latest guise, prefab and modular systems are seen by many as at least part of the solution to a more sustainable built environment.

In this incarnation, housing is a product; factory-made and highly controlled panels or fully formed modules are easily transported and assembled onsite, sometimes in a matter of days and often with non-professional labour. Buildings can be constructed in weather-independent environments, with no need to stall for heat or rain. Their lightweight, portable structures can also be suitable for rocky or difficult to access sites.

Those embracing premade housing in Australia say the benefits are multi-fold. "As a way of minimising resource use and waste, prefabrication is an important element of sustainable housing of the future," says *Your Home* author and Sustainable Futures director for UTS, Caitlin McGee.

"It can deliver benefits on a number of fronts:

resource efficiency, affordability (due to economies of scale), and flexibility (allowing households to add to their homes as their needs change, rather than creating extra space upfront 'just in case')." And crucially, the gap between a designer's sustainable specifications and a building's performance can be avoided, with digitised, controlled manufacturing of all components.

Most manufacturers offer bespoke designs or add-on options to a selection of standard models for a range of occupants and locations. Modular sections can also be added to traditional brick and mortar homes.

A growing number of designers are offering prefab alternatives in an effort to meet the demand for affordable and hassle-free housing. Here, we look at the stylish array of offerings on home soil.

See more detail on these and global modular innovations at sanctuarymagazine.org.au

We would also love to hear your thoughts and experiences with prefab – send us your pics and ideas via sanctuarymagazine@ata.org.au on Twitter (@sanctuarymag) or Facebook (/sanctuarymagazine).



⊕ Kitchens and bathrooms are constructed and pre-finished in the factory before the rest of the module's floors, roofs and walls are packed around them on hinges for transport. The interior wall lining is Elton Group FSC-certified Eply, which can be finished in a variety of ways to suit the client. Image by David Curzon.

Home in a box

MODE Homes

DESIGN

Matt Dynon Architect

BUILDER

MODE Homes

LOCATION

Sydney, NSW

ESTABLISHED IN 2014 BY SYDNEY

architect Matthew Dynon after two years of research and testing, MODE Homes takes off-site fabrication one step further; when you order one of their 'bespoke modular' homes, it's not just wall, floor and roof components that arrive on site ready for installation, but pretty much the entire house – folded up. MODE offers 'standard' (40 sqm) and 'stretched' (60-110 sqm) modules that can be "configured, connected, rotated and stacked in order to respond to different site constraints, solar orientations and accommodation requirements," explains Matthew.

Each module arrives with internal

finishes applied and services in place ready for connection. Kitchen and bathrooms are built and finished in the factory, and then the wall, floor and roof components required for the living and bedroom sections of the module are stacked around this central core for transport, reducing the size to about a third of the finished home module.

With a display home in Belmore, Sydney, MODE is working with the University of New South Wales to ensure its built homes achieve the design's 8 Star energy efficiency ratings in all Australian climates.



The Alpine house was carefully designed to make the most of views to the south while allowing maximum solar access from the north. Image by Ryan King.

Made to order

Habitech

DESIGN

Habitech Systems

BUILDER

Mat Kirley

LOCATION

Tolmie, VIC

MELBOURNE-BASED MODULAR DESIGN

and build company Habitech Systems, uses SIPs (Structural Insulated Panels) made from expanded polystyrene (EPS) sandwiched between plantation-grown Australian plywood and magnesium oxide (MgO) board cladding. MgO board is made from 50 per cent recycled timber and sawdust, its magnesium oxide content providing strength, durability and fire, water, UV and mildew resistance.

Applying the system in Mansfield's sub-alpine climate meant that the thermal performance of the building envelope was key. Habitech's SIPs have tested R values of

4.1 (walls) and 5.3 (roof), and importantly, the pre-constructed panel system allows for close to airtight installation that ensures these values are achieved. "The fine tolerances of factory manufacture allow us to produce panellised insulation with minimal gaps," says Habitech's Chris Barnett, "maximising the effective insulation to far greater levels than traditional batts and blankets."

Self-sufficient for electricity, water and wastewater treatment, the Alpine House was designed to rate 7.9 Stars, but in fact, has done better. A Melbourne University study found it had achieved 8.2 Stars.



The north-facing productive conservatory blocks and filters the harsh summer sun and captures the winter sun, drawing its warmth back into the house. Cross-flow ventilation is aided with in-ground cool tubes that bring cool air in from the floor in the south side of the house and high clerestory windows to the north that help purge hot air. Images by Tom Ross.

Carbon⁺ living

ArchiBlox

DESIGN & BUILD

ArchiBlox

LOCATION

Shown at City Square
Melbourne, now at Cape
Paterson, VIC

ARCHIBLOX'S COMPACT ONE- bedroom passive solar modular design made headlines earlier this year when it set up shop as Australia's first carbon-positive modular house in City Square, Melbourne, for the Sustainable Living Festival. The eye-catching prototype now has a permanent address at Cape Paterson on Victoria's south coast. Here its south side is nestled into the earth, with earth-tube cooling fed into living spaces.

A life cycle assessment which considered the carbon emissions of the building materials from source to site, building maintenance and operations,

found the house would be carbon positive, that is, producing more energy than it consumes.

Floor-to-ceiling double-glazed sliding doors allow full winter sun access, with openings blocked off with sliding edible garden walls in the summer. The green walls connect to the green roof, which works as another effective layer of insulation. The roof also houses a 5kW solar system and a solar hot water system.

ArchiBlox's Paperbark House in Inverloch, Victoria also features on our cover.



↑ The thermally massive rammed earth garage and base ground this prefab house, and the garage also provides cool air to the pantry. A north-facing curved deck made with reclaimed tallowood timber at the back of the house is shielded from summer sun with an automated retractable pergola. Image by Hilary Bradford.

Earthed comfort

Prebuilt

DESIGN & BUILD
Prebuilt

LOCATION
Inverloch, VIC

ANOTHER MODULAR DESIGN WITH an enviable position on a coastal hill, this Inverloch home is composed of three factory-produced modules with prefab lightweight framing that were craned into place complete with finishings and appliances.

The modules include open-plan kitchen and dining, two living areas and a large country-style walk-through pantry that links to the thermally massive garage, allowing coolth and ventilation for longer food storage. The rooms are arranged

around an internal courtyard that offers shelter from the prevailing winds and ventilation and natural light for living spaces. This north-facing courtyard allows solar gain in winter and is shielded from summer sun with an automated retractable pergola.

Happy homeowner Ken Connor's only complaint was that things happened more quickly than they were expecting. "The house is very cosy and comfortable and exceeded our expectations ten-fold."



Material selections for the prototype modular dwelling were selected for low embodied energy and low toxicity. Weathertex and Radial timber cladding were used for the exterior and BlueScope steel for the roof. Image by Warren Reed.

8 Star living

Ecoliv

DESIGN & BUILD

Ecoliv Buildings

LOCATION

Inverloch, VIC

THIS FUNCTIONAL 8 STAR PREFAB

modular design has a suite of sustainable features inside and out. There's a vertical garden at the entry, a surrounding dry-tolerant garden fed with an energy-efficient greywater recycling system, a 2kW grid-connected solar system, solar hot water system, electric car charging point and high-efficiency appliances internally.

All materials were carefully selected, preferring local manufacturing and those

with low embodied energy, including low-VOC plaster made with recycled product and FSC timber joinery.

The modules are designed to work within standard building measurements to avoid any offcuts. Ecoliv also has a commitment to recycle anything that cannot be re-used.

Stormwater is also funnelled through a channel to the garden beds in further resource efficiency.



Ecoshelta's passively designed lightweight and low-impact epod at Flinders Island, Tasmania (left) and Hong Kong (right). The pod can be erected singularly for pared-back living, or as multiple units connected together on site. Images by Tim Dubb and courtesy of Hellman Enterprises.

Shelter box

Ecoshelta

DESIGN

Stephen Sainsbury,
Ecoshelta

BUILD

Ecoshelta

LOCATION

Flinders Island, TAS

ECOSHELTA'S LIGHTWEIGHT

aluminium-framed and clad 'pod' design was created as a low-impact alternative for remote and ecologically-sensitive areas, says designer Stephen Sainsbury. Its bolt-down footing system means no excavations are needed, and the structure can be attached to native rock, eliminating footings altogether.

The freestanding frame and the composite wall panel, roof and flooring system can be packed up for relocation

within a few hours and assembled by hand, without the need for machinery. The pods are offered as an 'epod' – a single room-width cabin (35 square metres), complete with ensuite and clever underfloor storage, or as a combination of any number of pods to be bolted together on site.

The Japanese-inspired modular system features sliding walls and doors to open up the entire space to a broad platform deck around the building, with wide eaves for sunny and shaded options.



⊕
Cox Architecture's Mollymook modular design is a contemporary spin on the classic beach fibro shack. With a polished concrete insulated floor slab, wide openings on all sides, a retractable parasol roof and near self-sufficiency for power and water, it offers a low-impact escape and brings "great joy" to its owners. Image by Ben Wrigley.

Beach shack

Cox

DESIGN

Cox Architecture

BUILD

Smith and Primmer

LOCATION

Mollymook, NSW

THIS UNASSUMING BOXED BEACH

house puts a contemporary spin on the old fibro shack. At just 80 square metres, the single rectilinear space offers the simplicity of camping within the comfort of stylish passive design. Reclaimed Australian hardwood timber sliding doors on both sides open up the space to the surrounding bushland and allow cross ventilation through the living area.

The north-facing space houses a central stand-alone box for a bathroom and storage,

which also serves as a divider between sleeping and living.

The suspended insulated concrete slab is supported by a metal pan system which spans between the steel structure. The prefabricated steel-framed structure has an upper retractable parasol roof to shade summer sun and aid water collection. A second lower highly-insulated sandwich panel roof helps maintain comfortable temperatures year-round.



↑
Tektum's House 2.0 is lightweight and resilient, resting above the rocky terrain of Bilgola Beach with minimal foundation points. The inverted roof of the design helps direct heat out of internal spaces and allows the capture and use of rain water; the house has a 25,000L storage capacity. Images by Henry Obtmeier.

Cliff hanger

Tektum

DESIGN & BUILD

Tektum

LOCATION

Bilgola Beach, NSW and
Bucasia, QLD

TEKTUM'S HOUSE 2.0 OFFERED A solution to a steep block perched high above Bilgola's sandstone cliff beaches north of Sydney. The steel framing unit was craned in and the prefab flat-packed structure was unfolded onsite, avoiding disruption to the soil with minimal foundation points.

An integrated smart system allows the automated release of heat with high-level windows and cross ventilation, without the need for active heating or cooling. Its double-skin thermally-broken wall system helps moderate temperatures, while the

inverted ceilings and high-level windows direct and vent hot air with automated windows. The roof shape also allows the efficient collection of rain water for use.

The lightweight system is also resilient, tailored for the particular extremes of its local climate. The Bilgola Beach house is built to BAL40, Australia's second highest bush fire resilience rating, with fire-retardant decking made from recycled milk bottles and saw dust, while the Bucasia house is adapted for cyclone threats.



Modscape's remote South Australian design is comprised of structural insulated panels between structural steel framing. The house is entirely off-grid for energy, water capture and storage and waste. Image by Chris Daile.

Eco escape

Modscape

DESIGN & BUILD

Modscape

LOCATION

Willalooka, SA

THIS BEAUTIFUL RURAL PROPERTY

is entirely off-grid, creating its own energy, collecting its own water and disposing of its own waste.

The factory-built modules comprising structural insulated panels between structural steel framing were transported to site almost complete, including all finishings and cabinetry. Wide openings and high-level windows maximise natural

ventilation and heat purging in summer.

Recycled timber decking sits against spotted gum cladding and the Mt Gambier stone foundation, sourced from the property itself, allowing a comfortable blend with the environment.

Modscape has created a range of tailored modular designs in urban and regional Australia, including in the remote Kimberley region.



Designology's modular concept has been tailored for resilience to suit its fire-prone Kinglake setting. Convertible awnings seal the structure against extremes, creating an airlock between the exterior and the double glazing. Image by Brett Holmberg.

Convertible house

Designology

DESIGN & BUILD

Designology

LOCATION

Kinglake West, VIC

THIS LIGHTWEIGHT BARREL VAULT-shaped home in the fire-ravaged region of Kinglake has a focus on sustainability and resilience. Its heavily insulated corrugated iron curved structure allows easy water capture and storage, and remote-operable arched awnings used for shade, insulation, and to capture and funnel cool breezes for cross ventilation. The awnings seal the structure against extremes, creating an airlock between the exterior and the double glazing.

There are no load bearing walls to restrict the floor plan, with the modular system applicable for a range of uses and layouts, including community spaces, student accommodation or self-contained units.

The house also has a stand-alone solar system capable of running autonomously for around five days if required.



&U's community housing modular concept design was inspired by the need for more affordable urban housing and can be adapted to suit different climates. This is one of a number of standard designs using a modular composite fibreglass building system, used for its lightweight, high strength, and low maintenance needs, due to be released later this year.

Future tense

&U

DESIGN & BUILD

&U

CAROLINE PIDCOCK, LEADING sustainable architect and *Sanctuary* expert, has been working with her builder-uncle David on a new approach to building construction since 2005. After much development and testing by their R&D company, Origination, and a successful bid for a Commercialisation Australia Grant in 2013, &U was born. &U's building system comprises glass fibre reinforced polymers, commonly used in the boat building and aeronautical industries for their lightweight, high-strength durability in extreme conditions, and low maintenance needs.

While fibreglass manufacturing has been associated with high embodied

energy, advances in technology mean it be used in can be used in small quantities. The material was selected after a commissioned study found that the embodied energy of these composite sections is "significantly less than an equivalent section made from steel while similar to or better than timber." Recycling technology and more environmentally friendly resin composites are also on the horizon.

A number of standard designs have been developed with three prototypes due for release later this year. Caroline is also creating some specific designs with the system to demonstrate its application for well-designed, affordable buildings.

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Towards tiny

Synonymous with the more-with-less, alternative, affordable home campaign in the US, the Tiny House Movement is growing in Australia, with obvious green appeal.



Sanctuary was a media partner for the Melbourne launch of *Small is Beautiful*, a documentary by Jeremy Beasley which follows the lives of four characters in Portland, Oregon as they work to build their own tinies, including Nikki and Mitchell (pictured). You can request a screening of the film near you: www.smallbeautifulmovie.com/host-a-screening.

WORDS Verity Campbell
PHOTOGRAPHY Alicia Fox

TINY, MICRO, OR SIMPLY SMALL, A NEW generation of down-sized dwellings is on the rise. Emerging as an antidote to super-sized housing, a growing number of minute homes are being planned and built as part of the Tiny House Movement. The movement answers yearnings for a simpler, greener life. It challenges mainstream consumer culture and empowers people to take charge of the design and build of their own house.

Tiny houses have their roots in the US with pioneers Sarah Susanka, author of *The Not So Big House* book (2008), and Lloyd Kahn, author of *Tiny Homes: Simple Shelter* (2012). Jay Shafer and his Tumbleweed Tiny House Company propelled the movement with practical resources, off-the-plan homes and workshops throughout the country. There's now an annual Tiny House Conference and even an American Tiny House Association founded this year to assist members to navigate regulations, insurance, planning and other speed humps to doing things differently.

In Australia, the tiny scene is also blossoming. Tiny Houses Australia, and particularly its booming Pinterest and Facebook pages, is ground zero for Australia's enthusiasts. Founder Darren Hughes anticipated 30 or 40 followers when he set up the Facebook page two years ago. It now has over 16,000 'likes', just under half from Australia. Darren's modest "scrap book for ideas" has boomed into a thriving community that shares resources, ideas and eye candy, and has started running workshops around the country.

One of the first teeny dwellings built in Australia was recently sold on eBay, a relatively common occurrence in the US. For creators James Galletly and Alicia Fox, their first foray into tiny was conceived as a test case for James' business, The Upcyclist. With their first project a success, they're planning another tiny, a strawbale construction which they are hoping will open the door to more commissions.

The appeal of the movement, says James, is that it allows people to "exit the

cycle of perpetual home rental or long term mortgage debt". A tiny houser is someone who values a high degree of interaction with the outside world, he explains, and a desire for financial freedom, limited possessions and an outwardly focused lifestyle. For James and Alicia, the appeal is also the vastly reduced environmental impact that comes through building small homes with reclaimed materials.

Melbourne-based Fred Schultz has launched Fred's Tiny Houses to provide advice and support for aspiring tiny home builders. Fred's own tiny home was showcased at the recent premiere of the *Small is Beautiful* movie, for which *Sanctuary* was a media partner.

Director Jeremy Beasley created *Small is Beautiful* to document the tiny house movement through the stories of four characters in Portland, Oregon as they go through their tiny home builds. Jeremy is hoping the film will fuel the movement both here and overseas, and "inspire people to re-imagine the concept of housing".



James and Alicia's tiny house, recently sold on eBay, is made almost entirely from reclaimed materials (over 95%). The exterior cladding is a creative combination of salvaged zincalume, corrugated iron, cedar weatherboards and hardwood fence palings. The bedroom is designed to fit a single bed across the width of the room. The bed folds up into the back wall, with storage boxes underneath which can be arranged as seating when friends drop by.

"I like the idea of being generous to the street – you see so many places that don't engage with the street at all."

- Architect Andrew Maynard.



A sunny addition

A northern addition to an art deco bungalow in Melbourne's north makes the most of natural light and the garden, while being generous to the street.

WORDS Emily Braham

PHOTOGRAPHY Fraser Marsden

SARAH AND RICHARD BIDED THEIR time before embarking on a renovation of their period Ivanhoe home, and after eight years and three children they had a honed wish-list. They wanted to retain the original spacious bedrooms and living room at the front, but replace the dark and dated extension at the back with a new, light-filled multi-purpose living space and kitchen. For the bargain, they got a master bedroom which overlooks the garden, a separate laundry and bathroom, and plenty of clever storage.

Set on a quiet, dead-end street with a park a few doors down, the generous block had plenty of scope for change. However, they were determined not to take from their north-facing garden for more indoor space. Indeed, the decision to enlist architect Andrew Maynard was due in part to his commitment to small.

"It's something we try to do with all our projects, to do more with less," says Andrew. "We come from the perspective that the green space should be the aggressor rather than the victim – you see in a lot of projects



The addition's street-facing room-width glazing steps the house out to the footpath, a response to Sarah and Richard's attachment to their block's quiet outlook and an effort to "give something back to the street". The external aluminium shutters are closed on the hottest days, for privacy and to keep heat in overnight.



⬆
The bespoke structural reclaimed timber ‘portal’ framing, a design which was altered to suit the clients throughout the process, has been a talking point with guests and also features useful storage hooks for household items.

that the outdoors can become quite a weak space because it’s not considered as part of the overall design from the start.”

As a result, the landscaped native garden is the focal point of the open-plan addition, which exists side by side with the original art deco bungalow and features wide double-glazed sliding doors that open up the entire space to the north. “The footprint is almost exactly as it was,” says Andrew. “The back of the house is set north-facing so we just had to do the responsible thing and maximise that.”

Light is always the first part of the process for Andrew. In this project, a bold, room-width window on the eastern facade

steps the addition out to the pavement, flooding the space with morning sun. Mechanical louvres maintain privacy and keep out summer sun on the hottest days, and keep heat in overnight in winter.

The street-faced glazing, which Andrew admits they were brave to consider, was in response to Sarah and Richard’s attachment to their block’s quiet outlook. “We thought why not engage with the street a bit, let in that lovely morning light and at the same time have that option to be completely private,” Andrew says. “I like the idea of being generous to the street – you see so many places that don’t engage with the street at all.” →



The north-facing addition makes the most of its garden outlook, with wide openings for indoor/outdoor living and optimum solar gain. The roof is wrapped in hardwearing Ardex Butynol rubber, “a homogeneous surface that glues together like a giant condom with no flashings, gaps or seals, so maintenance is minimal,” explains Andrew.



The open-plan addition is a natural meeting place for the family with the inbuilt desk on the original brick dividing wall – which was left exposed for additional thermal mass – a place for the children to do their homework without being isolated from communal activity.





Most of the furnishings were locally sourced, including lounge furniture from Jordan and reclaimed timber stools from Pop & Scott. Generous insulation and overhangs plus double glazing and thermal mass keeps the space naturally cool, with the fans rarely needed.

The resulting sunny addition has become an all-purpose meeting place for family and friends. An inbuilt desk on the original dividing wall is a place for the couple's school-aged children to do homework, while remaining part of communal activity. It has also opened up opportunities for entertaining. Richard and Sarah weren't sure about a mirror splashback in the kitchen, but have found it an unexpected bonus – allowing them to see what the children are doing outside, or to chat with guests while preparing a meal.

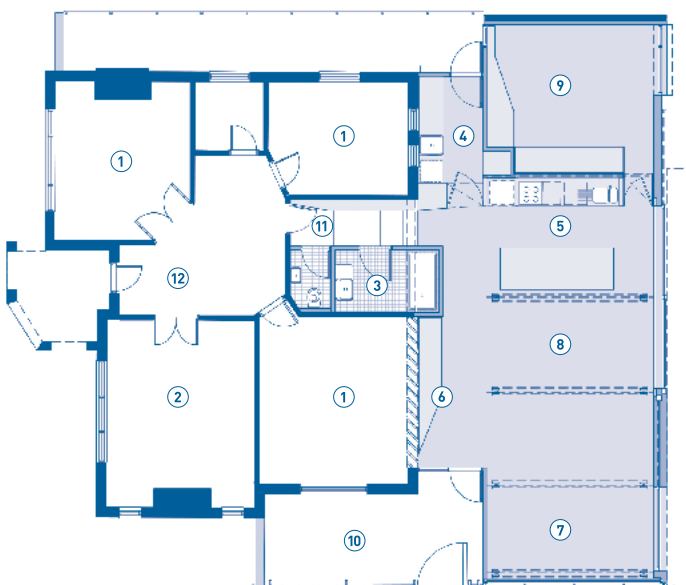
Visitors to the house are also struck by the new room's bespoke exposed beams. The reclaimed timber handcrafted structural 'portals' were an evolving idea of Andrew's. "We are really rapt with the look of it, particularly the curved edges, and we saw how hard the carpenter worked on it," Richard says. Originally the frames had square corners, but they opted to change the design part way through. "With their rounded edges, Andrew referred to them as Paddle Pop sticks, but others have since likened them to a Meccano set," laughs Sarah. "We needed them structurally, but we also wanted something architecturally interesting."

The portal supports generous insulation and wide overhangs, which along with the concrete slab and exposed original brick wall keep the space naturally cool. "The sustainable aspect was a big part of it for us, we definitely didn't want air-conditioning and we knew that was the approach Andrew and his team had taken on other projects," Sarah said.

For Andrew, "it's about getting those core principles for a comfortable and sustainable house right. If you don't start with these then you'll end up getting things wrong."

As a result the energy-efficient fans are rarely needed, and the process of creating a high-performing home has also affirmed the family's responsible use of resources. "I'm horrified now when you go into these places that have 10 or 15 downlights that all turn on at once," says Richard. "We have always been cautious and energy-aware, 'turn-off-the-light' people," adds Sarah, "but I think this process has made us think about what we turn on even more." 🌱

FLOOR PLAN



LEGEND

- | | |
|-----------------------|----------------------|
| ① Original bedroom | ⑦ Dining |
| ② Original lounge | ⑧ Living |
| ③ Bathroom | ⑨ New master bedroom |
| ④ Laundry | ⑩ Covered entrance |
| ⑤ Kitchen | ⑪ Hallway |
| ⑥ In built deck/study | ⑫ Entrance hall |

Della Torre house

—Specifications

Credits

DESIGN

Andrew Maynard Architects

BUILDER

TCM Building Group

PROJECT TYPE

Alteration & addition

PROJECT LOCATION

Ivanhoe, Victoria

SIZE

House 195 sqm,
land 700 sqm

BUILDING STAR RATING

6.1 Stars (this rating
excludes solar power).

Sustainable Features

HOT WATER

– Existing AquaMax Gas hot water system 5 star rating.

RENEWABLE ENERGY

– Existing Linuo 5kW solar array with Aurora 5kW inverter.

WATER SAVING

– 5300L water tank collects water from roof to supply toilets & external taps
– Ostar WELS 5 star-rated tapware in kitchen, bathroom and shower.

PASSIVE DESIGN / HEATING & COOLING

– Steel awning on north facade designed to control summer sun
– Exposed polished concrete floor for thermal mass
– Shallow room depth to allow for natural ventilation and cross breezes
– Operable aluminium louvres by Shadefactor on east facade.

ACTIVE HEATING & COOLING

– Gas Rehau in-floor hydronic coil heating with Baxi hydronic boiler

– Efficient Revolution ceiling fans by Hunter Pacific.

BUILDING MATERIALS

– Reclaimed messmate timber 'portal' frames from Eco Timber
– FSC spotted gum timber lining in hallway and walls
– Knauf Earthwool insulation: R6.0 thermal insulation to roof; 90mm R2.7HD thermal insulation sheet to external walls, plus sound control batts to all internal walls
– Concrete slab is insulated to the sides & underneath
– Ardex Butynol rubber product to roof
– Pico unglazed ceramic tiles by Mutina from Urban Edge Ceramics
– Caesarstone Jet Black kitchen benches
– Melamine pre-finished board 2-pack finish joinery in kitchen, hallway, bedroom and laundry.

WINDOWS & GLAZING

– Steel framed windows & doors by Skyrange Engineering
– Double glazing by Viridian.

LIGHTING

– The house uses low energy LED lighting throughout, including a TossB sphere light from Hub over dining table, Inkster Maken (Melbourne-made using locally sourced materials) Flashlight light fitting over island bench, custom-designed steel square fluorescent lighting by the architect.

PAINTS, FINISHES & FLOOR COVERINGS

– Low VOC Dulux Enviro2 paints.

OTHER ESD FEATURES

– House sited for maximum solar gain
– Locally sourced furnishings, including Jordan lounge furniture and Pop & Scott recycled timber kitchen stools and recycled Jarrah dining table.
– Permeable water sensitive landscaping with native vegetation, minimal hard surfaced areas, and reclaimed brick paving on compacted sand base rather than concrete.



Architect Andrew Maynard sought to integrate the house and garden for a seamless flow between spaces, maximising cross-ventilation, solar access and light. The garden was landscaped for water sensitive design, limiting hard surfacing and with brick paving on a sand base rather than cement.





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Claire Hanley used as many reclaimed materials as possible for her Sydney renovation. Kitchen benchtops are made from ironbark, salvaged from a bridge damaged during the 2011 Queensland floods; bricks are from the original structure; timber floors are reclaimed blackbutt from a demolished factory in Newcastle, while bookshelves and staircase are reclaimed, second-grade blackbutt. Image by Cameron Ramsay, Studio Commercial.

Re-build

Working with salvaged materials is labour-intensive, and often doesn't come with the savings imagined. But it can add character, history and plenty of satisfaction, as committed reuse architect Emma Scragg explains.

WORDS AND PHOTOGRAPHY: Emma Scragg

REPURPOSING BUILDING MATERIALS

makes sense. Up to one third of all waste in landfill is generated by the building industry, a substantial proportion of which could be redirected into new building projects, saving precious resources and money. Reusing building products in this way can reduce the embodied energy of a new house by up to 95 per cent. The gains speak for themselves.

However, reuse-building requires a mind shift for all involved – designers, tradespeople and owners. Conventional architecture typically develops a composition of forms and then seeks materials to achieve this. As architect Alejandro Bahamon puts it in *REMATERIAL From waste to architecture*, “In the case of architecture created from recycled materials...the process is inverted: the design team must first identify the sources of materials suitable for reutilization and then start to define the details”.

Sourcing secondhand materials and finding understanding builders and tradespeople takes time. Staging building work can allow necessary pauses to gather components, prepare them and design them in, unlike a traditional build timeline. Flexibility is also important; you can never be sure you will find quite enough of what you want, or you may find something you'd never considered, and want to modify the design to accommodate it. Owner-building can allow this flexibility, with owners able to use their own skills (or pure sweat) to save money, engaging experts when needed.

Despite the challenges, working with salvaged materials can add history, texture and character, and often results in great satisfaction. Reusing materials can also save money, but even when it doesn't (and often it won't), the benefits gained through reduced landfill and new skills can pay off generously.

REUSE OR RECYCLE?

Reclaimed, repurposed or reused materials are environmentally preferable to recycled or composite products such as decking or reinforcing steel. Reformed products generally require reprocessing and new resources, increasing the embodied energy, while reusing a product lengthens its life and often requires no new inputs.





Piece by piece

A staged approach and mixed palette of salvaged materials has given this Queenslander an original and evolving character.



Bifold doors, a favourite but often costly feature in contemporary homes, were cobbled together from several sets of doors and run on a sill milled from hardwood rescued from floodwaters. Linings of the various salvaged v-jointed boards were clear-finished to preserve “the history of old paint colours”, and to seal in lead paint. Restoring these “to make a straight wall” was one of the most time-consuming stages of the renovation.

OLIVER AND TRACY BERGEL

returned from a hiking trip in Europe inspired by the connectedness of living spaces and gardens. They decided to take the same approach with their elevated Queenslander, but with a commitment to reuse. Building in the open downstairs area meant they could continue to live in the house while they carried out the renovations, and helped restrict the building’s footprint, preserving their productive food garden.

While an inheritance assisted them to take time off work to focus on the renovations and extensions, they kept the budget tight by using reclaimed materials and their own skills wherever possible. They

began just as households all over low-lying Brisbane affected by the 2011 floods were casting out building materials for disposal. Oliver and Tracy repurposed a significant amount, supplementing this with kerbside hard waste and online finds as they went along.

Tongue and groove v-jointed boards, chosen for their “robustness and homey feel”, were rescued from a neighbour’s renovation and from one of Oliver’s building projects in exchange for a carton of beer. Bifold doors, a favourite but often costly feature in contemporary homes, were cobbled together from several sets of doors and run on a sill milled from hardwood rescued from floodwaters. Oliver built



Tracy and Oliver's creative renovation was a "process of what do we have and how can we use it?" The bathroom benchtop was made from recycled hoop pine found floating down the river, the laundry box made from various discarded timbers from Oliver's jobs and the original window retained and reglazed. Even the light over the mirror was rescued from a disused tennis court.



The temporary kitchen is a collection of old sideboards and cabinets from the original 50s kitchen upstairs with secondhand and reclaimed items, including the pendant light which was rescued from landfill. Oliver says much of the success of their ongoing renovation has been their flexible approach to 'finishing', and "learning to live with the mess."



the internal stairs from three different discarded external hardwood stairs, a slow but worthwhile project.

“In the process of demolition, not a single skip was used”, Oliver says. The original underhouse slab was extended and polished, and bricks reused for garden paths. Chippings of mortar were used as a bed for the widened slab. Even the sawdust was passed onto the chickens at the bottom of the garden.

Development of the design was organic. “It was a process of what do we have? How can we use it?” says Tracy “That’s been a really interesting and creative way of building with what we’ve got instead of going out and buying something”. Oliver’s

carpentry skills were a strong plus in the ability to adapt this mixed palette and Tracy gained new skills reglazing windows, painting and preparing secondhand materials for use.

Living on site, the project was able to be staged with the final push yet to come to complete the kitchen and external painting. I’d like to be finished but it’s been good to have spells in between the mess,” reflects Tracy, “So we can just relax a little and also go out and make some money”. Plans for the kitchen are eclectic with various salvaged cupboard doors to make up cabinetry, and a piece of terrazzo dug up from the garden as part of a benchtop.

Oliver and Tracy’s house

—Specifications

Credits

DESIGN

Oliver and Tracy Bergel

BUILDER

Oliver Bergel

COST

Materials \$60,000
No labour fees, but significant time.

SIZE

Land 600 sqm
House 200 sqm

Sustainable Features

RENEWABLE ENERGY

- Solar Edwards Australis LX Series 3 hot water system, with electric boost used occasionally on grey days in winter
- 1.5kW Sharp panels with 2kW Inverter Fronius 20 purchased through community power buying scheme.

REUSED MATERIALS

- All windows were reused. Hopper windows were used to the south for weather protection, salvaged from neighbour’s renovation
- Bathroom benchtop made from recycled hoop pine found

floating down the river

- Bifold doors cobbled together from several sets of reclaimed doors and run on a sill milled from hardwood, rescued from floodwaters
- Bricks from perimeter of under-house and outdoor step cleaned and reused in the mass south wall and garden paving
- Stairs made from several sets of re-milled disused stairs
- Tongue and groove v-jointed boards were rescued from a neighbour’s renovation and from one of Oliver’s building projects.

OTHER ESD FEATURES

- Greywater pipework set up for a reed bed system, which will take bath, basin, shower and laundry water
- Original footprint of the house not increased by doubling of floor area, preserving garden space.

A problem shared...



External cladding is reclaimed Australian hardwood, all windows are reused from friends' discards. The enclosed deck has two recycled timber custom-made barn doors, spaced for light and breezes.

Peter and Teresa's family home, a careful composition of old and new in a series of pavilions, will continue to evolve with their growing family and changing lifestyle.

WORDS Emma Scragg

PHOTOGRAPHY Alex Hunt

WHEN PETER MCARDLE AND TERESA

Wuersching designed their new home at Currumbin Ecovillage, they knew they wanted a model which would allow staged construction. A mix of prefab and traditional on-site building with reclaimed materials, found over time, made sense. A collection of pavilions meant they could, "build what we want, when we want it", says Peter, "and minimise site disturbance".

Designed as a cohousing set-up, or for the pavilions to change function as the children grow up, there is a main living pavilion, a future parents' retreat, which is currently their home office, and a guest pavilion which they currently rent out.

"First, we targeted items that are relatively easy to find, like carport framing and deck framing, then visually high value items which you touch and feel to add character and history, then high eco-value items," to reduce embodied energy and environmental impact, such as reused cabinetry and aluminium and timber windows and doors.

The Ecovillage's Village Design Code specifies 20 to 25 per cent recycled content. "We wanted to strike a balance where the recycled elements are visible, and to set



these off against a plain and simple ‘new’ backdrop,” Peter says. Clear-finished recycled vj cladding on the southern wall of the guest pavilion, hardwood framing, reused doors and windows are set against clean lines of low-maintenance fibro and corrugated steel. Window and door boxes of reclaimed hardwood are gradually being added to better protect the openings from summer sun and rain.

Peter and Teresa addressed the challenge of incorporating reused doors and windows and other materials with a “regular [design] grid into which the [irregular] recycled elements sit.” This gave them freedom to pick and choose and refine details as they went along. This disciplined grid also made efficient use of structural and cladding materials, helping control costs.

In the garden, which continues to evolve, black and white roof tiles, salvaged

from a re-roofed house nearby, are stacked as raised garden edges and serve as features and paving. UngROUTED, they can be easily rearranged. Recycled breezeblocks form a durable privacy screen between the main home and secondary dwelling whilst maintaining airflow.

Internally, secondhand kitchens were installed. Secondhand pendant lights were bought for one dollar on eBay and other elements sourced from demolition yards and online. Floor tiles in the ensuite are a mosaic of random samples, and the furniture is mostly secondhand. While saving materials costs, there was a significant labour cost in reusing old elements, but Peter says they saw great value in this. “We’d rather support the electrician or chippie or plumber locally and use recycled than pay more for new everything”. 5

⬇️
The kitchen is a compilation of a couple of different but closely matched kitchens from an old unit complex where owners are progressively upgrading. Peter advises that reusing kitchens can be tricky due to potential water damage, difficulty in sourcing parts for leaky taps, and fitting old units to new layouts. This kitchen was designed based on what they could source.





The reused external hardwood window bays were sourced by the builder and left rough and unfinished. Doors for the pavilions were sourced from a variety of renovations, demolitions and recycle yards. “We were happy to play with an assortment of doors with this house which made sourcing the doors more fun than trying to make sure every door matched,” laughs Peter.



TIPS FOR REUSE

“If you have the time and skills the financial savings can be enormous, and the whole process can be one of creative fun, but it’s not necessarily a cheap option,” says Oliver. “Do it if you love the look or idea or want to reduce landfill and embodied energy.”

- Op shops and garage sales are handy for light fittings, door knobs and smaller items
- Demolition yards and online are often the most cost-effective options
- Befriending a builder, particularly during demolition, can reap rewards
- Be patient and keep looking

- Host parties – feed friends while they clean bricks, pull out nails or paint
- Pick a builder who’s used to using salvaged materials – they’ll often have existing contacts and sources.

“We find eBay a good source of inspiration – it’s like a lucky dip so long as you are patient,” says Peter. “Also let friends and neighbours and family know you are looking – it’s amazing how many people have a window or door or spare furniture in the garage or know someone else who’s renovating.”

Peter and Teresa’s home

—Specifications

Credits

DESIGN

PTMA architecture

BUILDER

Phil Treby

COST

\$450,000

SIZE

170 sqm over two households

Sustainable Features

RENEWABLE ENERGY

- Origin Energy 1.5kW solar PV
- Equinox solar hot water system.

REUSED MATERIALS

- External cladding is reclaimed Australian hardwood
- Windows are reused from friends’ discards
- The enclosed deck has two recycled timber custom-made barn doors
- Secondhand kitchen joinery from apartment complex retrofit, including reused gas cooktop and oven, sink and mixer

- Mixed assortment of doors and windows from Red Neds Salvage and Secondhand
- Reclaimed breezeblock feature screen salvaged from a Brisbane garden redesign via eBay
- Salvaged external hardwood framing
- Reused roof tiles used ungrouted in garden edges, retaining walls, and ramp landing
- Reused light fittings and pendants
- Predominantly secondhand furniture, mostly sourced via eBay

- Large casement window was a leftover from another job the builder had worked on, the design was modified to suit.

OTHER ESD FEATURES

- Laundry, carport, and (in future) a main kitchen and dining area are to be shared to minimise resource use and encourage community. Village also has a shared pool, pizza oven and community hall.
- Worm farm, composting and the start of a productive garden.

House & garden

Often gardens play second fiddle to the house design – a deck and a vegie patch tacked on once the build is accounted for and if any budget remains. Free Range Food Gardens permaculture landscape gardener Gordon Williams makes the case for an integrated approach.

WORDS Gordon Williams

PHOTOGRAPHY Nick Stephenson

THERE'S NO SHORTAGE OF

knowledge about good design in both the building and landscaping fields covering aesthetics, functionality and efficiency. But for the most part they are treated as separate entities, failing to consider the exciting possibilities a holistic approach during the design process can offer.

While it is important to make improvements to existing homes by retrofitting them and the surrounding landscapes, many options are limited by the cost of making changes to previous works. New projects allow the chance to step back and look at the whole picture. We can design places to live that are comfortable, affordable to heat and cool, resource conscious and beautiful when a broader

approach is taken. Pen and paper design changes early on can multiply savings during construction and implementation, while reducing ongoing running and maintenance costs.

Let's consider the ways we can minimise energy and resource use by integrating the outdoors and the built environment. There is the obvious role that plants can play in providing shade. We all know the difference the shade of a tree can make on hot and sunny days. But there are many less obvious ways they can benefit our indoor spaces.

On those sunny days when plants are photosynthesising their food from sunlight, they also transpire water from their leaf surfaces. Kind of like sweating, it keeps the plants cool and has the added benefit



Phil Edwards took an integrated approach with the sustainable renovation of his inner Melbourne terrace [profiled in *Sanctuary 26*]. There is the small outdoor area on the ground level with a rain garden and a sand pit for the kids (which will eventually become a plunge pool); the front and back rain gardens; an internal courtyard that lets in natural light and air, and a green roof which make the outdoors an ever-present aspect of every part of the home.





The vegetable garden is a key part of Melissa and Rafael's life, so it made sense to prioritise garden access and green views in their Melbourne renovation [profiled in *Sanctuary 21*].

GREEN SHADE

- In tropical Australia, evergreen plants are ideal for keeping direct sunlight from entering and heating the home.
- In southern and temperate regions where temperatures are hot in the summer and cool in the winter, evergreen plants are best kept on the southern side of the building. Deciduous plants can be used on the north, east and western sides to let in valuable winter sunlight.
- Trellis vines are a great way to provide shade. By using a trellis it is easy to control the size and shape of the plant and what it shades. The root systems of vines are much more suitable to have near a building than that of a tree.
- Shade- and moisture-loving plants such as ferns can be placed on the shady sides of the building where a breeze can bring cool moist air into and around the home. A pond and a trellised evergreen vine over this area can enhance this effect. [Ed note: see more on edible shading tips in *Sanctuary 27*.]

of cooling the surrounding air. Leaves also provide a perfect surface for water vapour in the air to condense upon, warming the leaf surface and surrounding air. Simply put, this means that plants have the effect of moderating the temperature and the humidity of their surroundings. For more comfortable and stable temperatures year round, and a reduced reliance on electricity or gas for heating and cooling, it makes sense to make use of plants around the home.

Not only can the landscape benefit the home, but the building itself can be of great use to the landscape. Consider how physical and energy resources like the wind and sunlight move through your site. The shading and wind buffering effects created by the building can allow for ecological niches and a greater diversity of plant life.

The home is also a source of resources that can help a garden thrive. Rainwater harvesting and grey-water recycling systems can provide an additional supply of water through the dry times. We all know water wants to move downhill so why not design to use gravity to move water where it is needed instead of pumps. Planning for the redirection and use of greywater and stormwater for your garden early on, around your plumbing system, will avoid

difficult or costly infrastructure changes later.

A large volume of organic material from the kitchen can be directed to compost, worm farms or even to the humble chicken where the nutrients will be conditioned to improve soil and plants. And if you play your cards right, you could even be rewarded with fresh fruit, vegies and eggs.



Gordon Williams is a permaculture landscape gardener and principal of Free Range Food Gardens in Sydney.

www.freerangefoodgardens.com.au

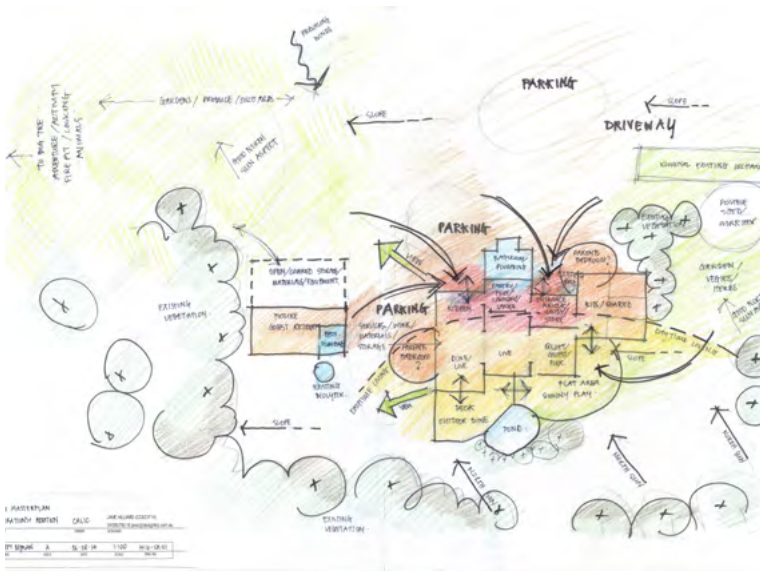


Jane Hilliard is lead designer at sustainable garden and home design agency Designful in Hobart.

www.designful.com.au

Building designer with Designful, Jane Hilliard, is an advocate for an integrated approach, and teams up with Good Life Permaculture to create interconnected sustainable homes and gardens. She says most systems in a home and garden can feed into each other, to create a self-supporting 'ecosystem' that reduces the need for outside resources. She shares some tips:

- The whole property system needs to be designed around the topography, the sun and climate. A master plan concept can help prioritise and connect the best use of available sun, aspect, flat areas and drainage systems. For example, a natural drainage system could be used to complement food gardens. The house can be positioned on the property so it doesn't shade productive gardens from much-needed sun or to protect areas from wind.
- A fundamental link in the food production system is the vegetable garden to mud room, to kitchen flow. This link allows the natural and easy progression of food from the garden to the table. If considered in the design stage this flow can be maximised, easy to use and a satisfying part of your lifestyle. (The mud room is an intermediate room between outside and inside that can combine laundry, storage, potting and seed-raising – I consider mine one of the most important rooms in the house!)



Designful and Good Life Permaculture teamed up to create this integrated master plan design for a Hobart renovation. The concept integrates natural drainage and plumbing to benefit productive gardens, and makes the most of natural habitat for biodiversity. The new garden and the home are designed around the sun and climate for optimum food production, environmental benefit and enjoyment.



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Shared living

Australia's cities are growing at a rapid rate, with projected population increases demanding dramatic changes to the way we design and live in them. Dr Fiona Whitelaw considers shared living, in varying degrees, as one response.

WORDS Dr Fiona Whitelaw

AUSTRALIA'S CITIES HAVE A PROBLEM; they're sprawling outward, propagating energy-inefficient suburban housing and cannibalising arable land with large, low-density dwellings. By world standards, this model of living is pretty weird. Far more common is dense urban housing with flexible, often multi-generational dwellings where a variety of parents, grandparents, aunts, uncles, in-laws and children live together, sharing care, chores and resources.

For Sydney architect Andrew Benn and his wife Alice Penna, it was an appealing model, one that promised economies of scale in Sydney's expensive property market but also a way of life that would enable them to sustain strong family connections.

When Andrew's mother, Professor of Sustainable Enterprise at UTS Business School, Suzanne sold the large family terrace in Sydney, Andrew and Alice, and Suzanne and Suzanne's partner set about creating a 'family complex' where they

could all live together while maintaining a sense of privacy and their own busy lives.

Andrew worked to renovate two adjacent Victorian worker's cottages in Sydney's Balmain, adding a small, self-contained apartment. The project would eventually win the NSW Architecture Awards in 2014, but not without its fair share of hurdles. Andrew needed to make sure that the design incorporated everyone's desire for privacy while enabling light, liveable spaces. On top of that, both cottages lay within Balmain's heritage area, which restricted possible changes, particularly regarding changes to the streetscape.

However, there was one crucial aspect they didn't need to worry about; the cottages had north-facing rears. "I'd lived in a larger, but south-facing terrace, and it made me realise the importance of sun and light, especially in the parts of the house where you do the most living – generally out the back in the kitchen and living

areas," she says.

Secondhand materials, including bricks and floors were used, while shared solar panels and water tanks make the most of the family's intergenerational complex. But while the building is environmentally sustainable, it's the social sustainability that especially appeals to Suzanne. For instance, the additional small apartment adds to the flexibility of the housing, meaning that more family members, perhaps a grandchild, or, at some stage, a carer, could move in too.

Flexible housing that accommodates more than one or two generations is increasingly popular, especially in inner city areas of Australia where land prices are high. It's a model that Tone Wheeler, principal architect at Environa studios, is familiar with "Australians want more flexible housing, housing that responds to modern lives, and especially housing that supports multi-generational living," he says. This kind of housing, "satisfies



Kapitbahayan (Filipino for neighbourhood) is an alternative, community-driven social housing project designed in collaboration with a multicultural housing cooperative in Western Sydney. The Canley Vale development includes six attached houses with the communal use of a library, deck, vegetable gardens and informal gathering spaces, with a focus on maintenance-free materials. Project designer Hugo Moline says Kapitbahayan is a prototype alternative to suburban sprawl and its "inefficient single, detached houses which breed social isolation and reliance on car use." Image by Mike Chin.



Andrew and his mother Suzanne’s adjoining cottage renovations allow for the sharing of space and resources, while maintaining privacy. The reclaimed-brick dividing fence has deliberate gaps that allow dogs, children and adults to move between the houses, making the garden semi-shared. The building angles direct views between the properties.

the ‘triple bottom line’ of energy density, affordability and social sustainability.”

Socially, semi-shared housing can combat alienation and loneliness, and foster more flexible care options for young children and the elderly. On top of that it increases demand for local hubs of shops and businesses, contributing to thriving neighbourhood centres. Higher density, urban living also maximises energy efficiencies and takes the pressure off greenfield, undeveloped land. And it addresses housing affordability.

“Most banks won’t lend on anything (dwelling) less than 50 square metres without a 40 per cent deposit. That prevents a lot of couples and small families from accessing their own apartments.” A family complex can be much more economically viable, says Tone.

Flexible, infill housing appeals to families who want to pursue intergenerational living arrangements, but it could help address Australia’s looming problem with urban sprawl. Architect Trina Day recently conducted research into urban sprawl and infill housing, and argues that current planning legislation,

often propagated by inner city residents concerned with protecting their amenity and streetscapes, limits urban density.

Trina’s research was a response to the changing nature of Australia’s households; the nuclear family is no longer the norm, and yet new housing stock seems only to respond to this model. The solution, she says is to make use of existing housing stock and infill development in the middle-ring suburbs where there is the most opportunity for adaptation. Here there are robust houses, close to the infrastructure needed for sustainable living, that a range of people can afford to live in.

“We are looking at an opportunity lost,” she says in the report. “The most appropriate site of intervention for increasing the number of dwellings is the vast expanse of existing suburban development. Better to work toward improving what we have before increasing the scale of the problem.”

Trina says plans such as those in Sydney for 770,000 new dwellings to match population growth are environmentally disastrous. “The squandering of arable land close to the city, the sourcing and transport

of the vast amounts of construction materials required for buildings, roads and services and the increased car dependency of outer suburban development make a mockery of any effort to control the carbon footprint of our city.”

There are many sensitive infill options that increase the person-per-square-metre ratio without compromising liveability. This type of infill maximises efficiencies, such as electricity and plumbing, and, with increased shared resources such as gardens, rainwater tanks and guest accommodation, also fosters social cohesion. It could make home ownership accessible to more diverse arrangements than the nuclear family, for instance, two single friends, or two couples and a relative.

However, building in this way can be problematic.

“Australia’s housing stock is very conservative, and that’s in part because councils, the building industry and even clients themselves are relatively conservative. It’s simply easier to imagine a suburban home when that’s what you’ve always been familiar with,” says Tone.

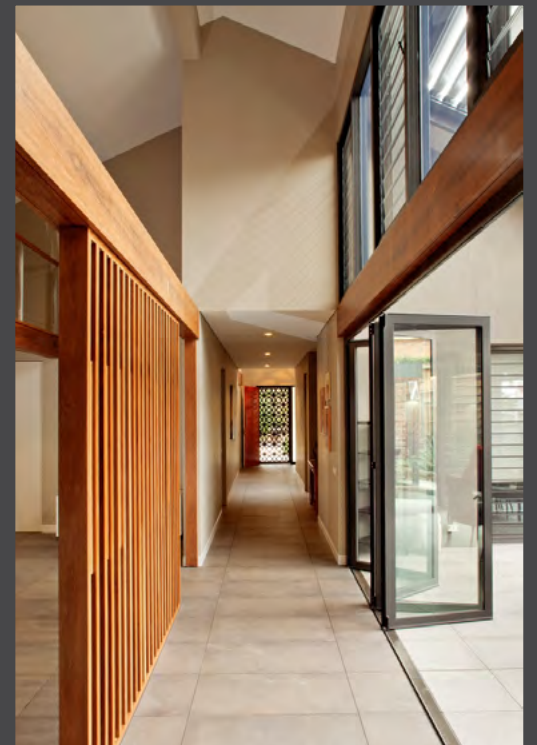


The Benn and Penna adjoined cottages share a common entry landing to allow interaction between the households.

Housing conservatism also results in restrictive planning rules, especially regarding infill housing. However, according to Tone Wheeler, good architectural design minimises potential problems associated with higher density living such as overshadowing, noise and amenity.

“Just one example we use is ‘inside out’ double brick veneer. Double brick veneer was originally used in passive solar homes to improve internal thermal mass and regulate temperature. But when it’s designed well it can also provide excellent soundproofing, which helps with privacy and addresses one of the main concerns surrounding infill or higher density housing – noise.”

Andrew Benn’s Balmain design is just one example of flexible urban housing that is not only passive solar, but also ‘passively social’, implicitly enhancing everyday interaction and care, increasing environmental as well as social sustainability. And, with Australia’s population predicted to increase by up to 100 per cent by 2050, around 90 per cent of that in urban areas, it’s a model we could do with seeing a lot more of in the future. 📍



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Design workshop: Home on a budget



Peter and Alison are looking towards retirement, seeking the good life and a new sustainable home in country southern Queensland. They have done their research and are committed to a low-budget, small-footprint home. Architect Stephanie Skyring offers a possible design solution.

After much research and modelling, Peter and Alison are confident they can create a low-impact and budget, small sustainable home for retirement.

Details

PROJECT TYPE

New build

LOCATION

Mount Marshall, Queensland

SIZE

Land 5 acres
Proposed house 100 sqm

BUDGET

\$150,000 to \$250,000

The Brief

- A low-cost, low-maintenance one-bedroom sustainable home for retirement that will be comfortable in all seasons
- A composting toilet and greywater recycling system
- A thermally-massive pantry that could work as a fridge for part of the year and keep food fresh year-round
- Skillion roof design
- A 2-stage building process to allow for flexibility of final design and change in circumstances.

RATHER THAN SLOWING DOWN, AS

a lot of people might consider doing as they approach their later years, ATA members Peter and Alison Moxom plan to do the opposite. Spurred on by a yearning for good, home-grown food, clean air, and long days in the garden, the couple settled on a green parcel of land in Queensland’s Mount Marshall. “The Southern Downs climate influenced our decision,” says Peter. “As coast dwellers for the last thirty years we were over the humidity.”

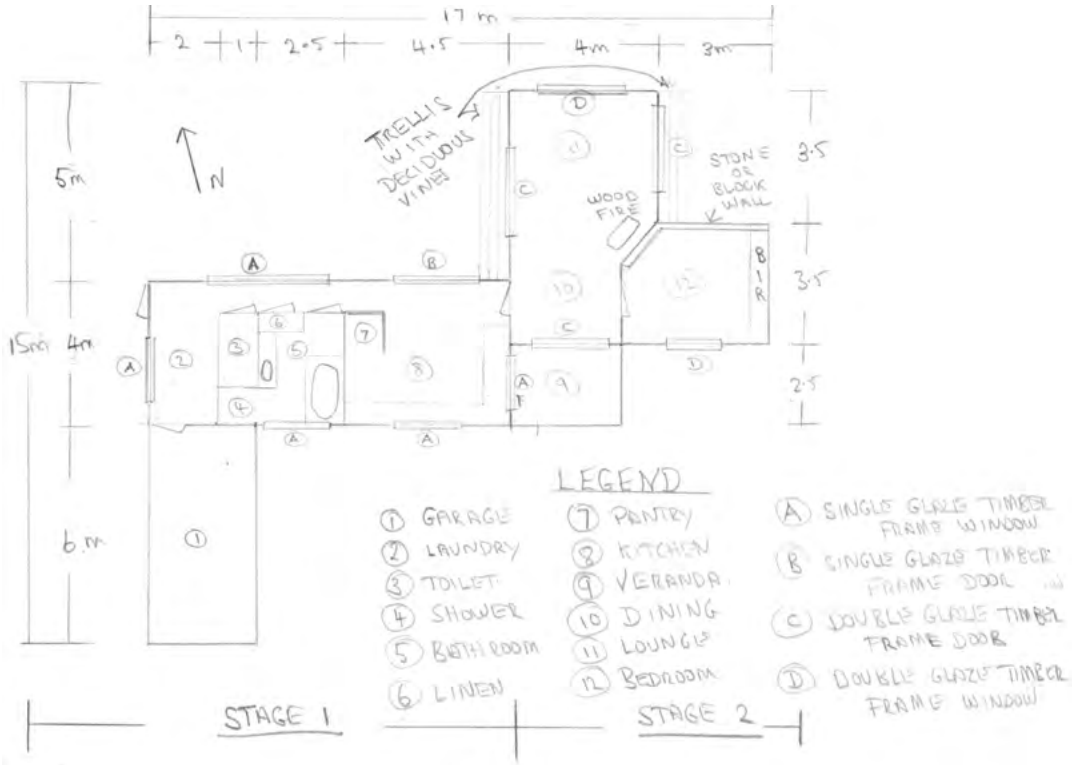
At first they considered purchasing an existing house, but inspired by modern advances in sustainable building and

passive solar design, decided to start from scratch. The wonderful view over the valley towards distant hills was also a motivating factor.

The block slopes down towards the south-east, which while a slight disadvantage for optimum solar orientation, gives full exposure to the cooling south-easterly breezes in the hotter months. After inspecting properties with northerly aspects which “baked”, and recording sun angles and shadows for the last two years, Peter and Alison are confident their design will have good winter sun access and not overheat in summer.

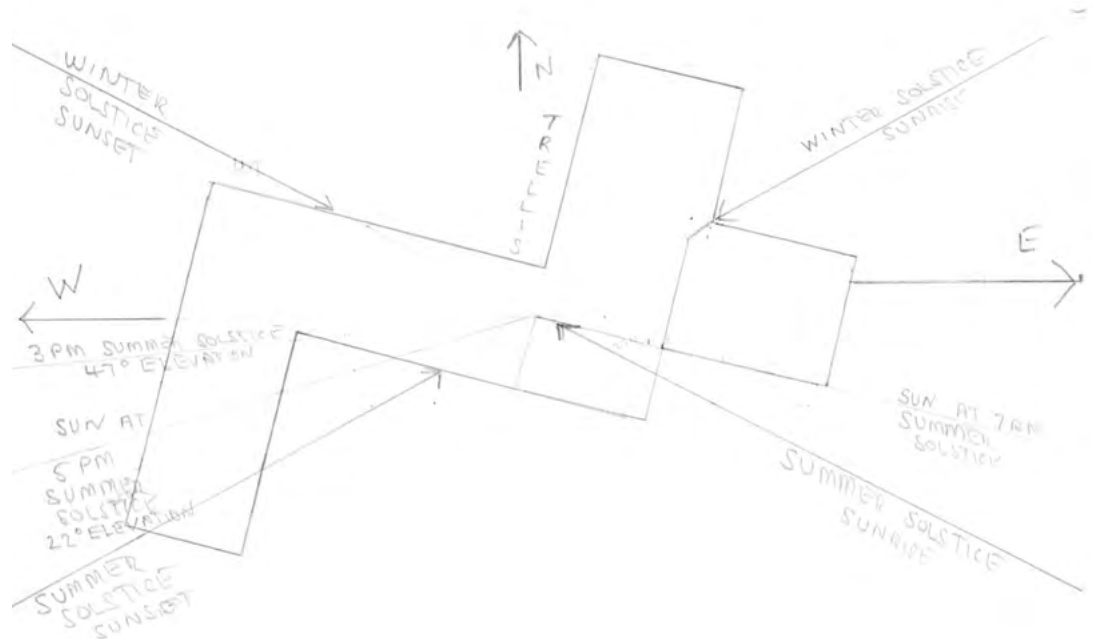


Peter and Alison’s Mount Marshall block slopes down towards the south-east, which while a slight disadvantage for optimum solar orientation, gives full exposure to the cooling south-easterly breezes in the hotter months. The lovely views over the valley towards distant hills in the south were also a definite drawcard.



➡ Planned stage 1 design.

➡ Sun angles for the site.



THE DESIGN RESPONSE

I love Peter and Alison's enthusiasm for new challenges, even into retirement. Their vision for a healthy sustainable lifestyle is inspirational. They have put a lot of care into choosing a beautiful site, understanding the sun paths across the site and creating a climate responsive design.

I have proposed a smart, cost-effective design so the whole house could be built at once and they could get on with living their dream lifestyle. It is easy to shorten or extend should they so choose.

THE SITE

Mount Marshall has a temperate climate with low humidity and a large diurnal temperature range of around 16 degrees. The earth temperature is around 23 degrees all year round – this is ideal for solar passive design with thermal mass to help regulate internal temperatures. Optimal effects are achieved with a concrete slab on ground to take advantage of the stable comfortable earth temperature, also known as 'earth

coupling'.

Cooling summer breezes come from all directions, as do winter winds.

The site slopes down to the south, towards the street and also towards the mountain views.

THE HOUSE PLAN

I like Peter and Alison's proposed plan with a variety of projecting rooms and multiple roofs, but I think it could complicate the design, and add unnecessary costs. It could also make it difficult to locate furniture, and it seemed there was a lot of wasted space.

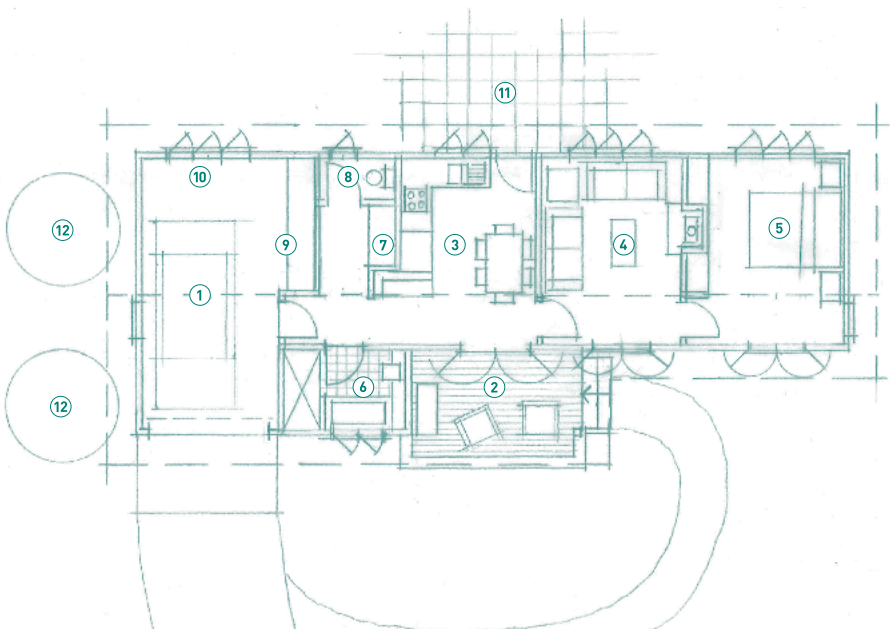
With this in mind I have extended their rectangular stage one floor plan and added furniture to ensure it is functional. This design solution achieves numerous outcomes in a cost effective way:

- Less is more: The compact floor plan minimises external wall and roof area, thereby reducing heat loss. This also keeps down materials usage and with this environmental impact and construction

cost. I have combined rooms to achieve multiple functions – the laundry / mudroom / drying area is now in the garage. The kitchen and dining areas are together.

- Passive heating: All living areas face north. The separation of kitchen and lounge was a specific lifestyle preference from Peter and Alison. It also allows rooms to be shut off for heating.
- Breezes: Breezes flow best in straight lines so windows and doors are located opposite each other.
- Rainwater collection: The roof design enables collection of all rainwater.
- Solar power: The gable roof faces north and is pitched at 25 degrees for optimal installation of solar panels (The exact roof angle should be confirmed with a solar panel installer).
- Views: All living areas and the bath have views to the south mountains.
- Plumbing: All wet areas are located together and are close to the tank storage to minimise pipe runs and reduce water wastage.

PROPOSED PLANS



LEGEND

- ① Garage
- ② Entry/Veranda
- ③ Kitchen/Dining
- ④ Lounge
- ⑤ Bedroom
- ⑥ Bathroom
- ⑦ Linen
- ⑧ Toilet
- ⑨ Laundry/Mudroom
- ⑩ Internal drying
- ⑪ Winter courtyard
- ⑫ Rainwater tanks

CONSTRUCTION & MATERIALS

Peter will be building the house himself with a builder friend, so the design has small structural spans and beam sizes to enable easy construction by two people.

Floor Materials:

Peter and Alison would ideally like a timber floor, but they were concerned about how to optimise heating without enough thermal mass. In addition, the direct winter sun could dry out the timber, which may become a maintenance problem over time.

For these reasons I think a concrete slab is the best option. It allows the house to be on ground and level throughout, rather than stepping up from the garage to a raised timber floor. A concrete truck would already be required for the garage slab so it makes sense to pour the whole floor at once.

Concrete is a very hard finish so I suggest using linoleum over the top to get a comfortable all-natural surface without insulating the thermal mass benefits. Peter's suggestion for WalkEasy cork-blend flooring may be a comparable option.

Wall & Roof Materials:

Structure: The walls are plantation timber frame.

Thermal mass: Two walls (between the kitchen and lounge, and also the lounge and bedroom) could be block or recycled brick, but this is not essential if costs are too tight as the floor provides plenty of thermal mass. Thermal mass walls need to be insulated from the exterior to prevent unwanted heat gain in summer and heat loss in winter. The thermal mass wall thickness must enable heat to be absorbed and released within the 12 hour day to night cycle. If walls are too thick, the time delay will not effectively even out temperatures. The optimal depth is

between 50 and 150 millimetres, such as 100-millimetre-concrete-blocks or 110-millimetre-brick.

Wall sheeting: Magnesite Board sounds like a good product, however it still contains raw product mined in China and imported to Australia. A more sustainable outcome could be achieved by using materials that would otherwise be going to waste. Demolition yards and online trading sites such as Gumtree offer a range of 'new' building materials from building sites that were over ordered. You can also use weatherboards and other hardwood boards from demolition, but be aware that they may have lead paint to be removed.

Roof: Plantation timber frame with a raking ceiling would be a good option. However, trusses and a flat ceiling would save some costs. Corrugated steel would be a cost-effective and low-maintenance option for the roof.

Windows:

Window size is a balance between minimising heat loss, achieving adequate day lighting, solar access and ventilation, and capturing views. I have used windows with a head-height of 2400 millimetres and French doors as windows to the south in the bedroom and lounge to optimise sky views and daylight without direct sun.

All external doors are hinged doors because they are more cost-effective to buy and easy to install. They also achieve a much more effective thermal seal than a sliding door.

Windows are casement to allow 100 per cent opening and to channel breezes into the house.

Energy efficiency testing may reveal that you can avoid double glazing in this climate to further save on costs. Ensuring all glazing is insulated on cold evenings with close fitting blinds / curtains with pelmets may be adequate.

CONSTRUCTION COST:

The total floor area is 94 square metres. Multiplying a ballpark square metre rate suited to basic architectural new build, say \$2,300 per square metre, the house costs approximately \$215,000 (excluding sewage treatment system, water tanks, solar power and battery storage, long electricity cable runs, driveways and external hard landscaping, furniture and curtains/blinds).

There are additional transport costs with an isolated regional site, but because Peter and Alison are building it themselves there will be significant labour cost savings making it achievable within their budget of \$150,000 to \$250,000.



Skyring Architects specialise in creating smart, beautiful, sustainable and climatically comfortable new homes and renovations, carefully and creatively customised to their clients' individual needs. Stephanie Skyring works closely with her clients to ensure their dreams are realised and that their design and construction process is cost-effective and enjoyable. Skyring Architects offer a range of flexible services to suit all budgets from the complete architectural service, through to design workshops and advice for DIY renovators at hourly rates.

www.skyringarchitects.com.au



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CROSBY architects



Carpet choices



WORDS

Melissa Wittig

Melissa Wittig is a health-focused interior design consultant, Principal of Healthy Interiors and Relish designs, and author of The Smart Living Handbook, creator of The Healthy Home App and Healthy Interiors Resource Hub.
www.healthyinteriors.com.au



1 Cavalier Bremworth's Kennedy Point 100% New Zealand wool carpet has a ECS Level 4 rating. The company has a recovery and recycling program for commercial carpets when replacing with their product.

While rustic floorboards and polished concrete have long been the mainstays of sustainable design, carpets are still often used in bedrooms for their softness and insulating qualities. Interior designer and healthy home expert Melissa Wittig helps you tread the woven path.

ENVIRONMENTAL IMPACT

While thermally massive materials such as concrete and tiles are often preferred for living spaces to help moderate temperatures, carpet does have benefits in the right space, offering warmth underfoot, noise reduction and insulation. However, the environmental impact of carpets varies widely. One of the primary issues is the relatively short life cycle of some carpets when compared with hard flooring materials.

Agriculturally sourced fibres have wide ranging impacts depending on the intensity of production, land and water use and the related outputs of the farm. Life Cycle Assessments (LCAs) aim to cover all of these aspects, but for agricultural commodities this is inherently complicated and not all assessments will cover farm processes.

The need to regularly vacuum carpets to lengthen life, maintain appearance and reduce dust should also be considered alongside the embodied energy – that is, all the energy required to produce and distribute the product for use. →



Havan Esperanza sisal carpet by Interfloor. Sisal fibres are from the agave sisalana, a native of Mexico. The hardy plant grows well without chemicals all year round in hot climate and arid regions which are often unsuitable for other crops. Both coir and sisal contain tannins which repel dust mites and are non-static.

Carpets are recyclable, but current rates of recycling or reuse in Australia are low. When carpets are recycled, only one reuse is generally possible, with around 25 per cent of the carpet likely able to be reused as carpet, a further 25 per cent could be retained for carpet backing and half the carpet sent to landfill where it could take up to 50 years to break down, releasing greenhouse gases in the process. And of course some components of nylon and synthetic materials from petrochemical origins will never completely break down.

Some manufacturers operate their own recycling programs and will collect your old carpet for reuse as part of the installation agreement, though this is more common for commercial properties. Meanwhile, innovative programs such as one at Deakin University are working to reuse carpet and textile polymer waste in concrete.

WHAT'S IN MY CARPET?

The components of carpet are cushion or underlay, adhesive and carpet.

There are generally two categories of materials that can be used on their own or blended to create carpets, natural or synthetic. However, more recently we have begun to see the production of alternative composite material carpets, such as those made with recycled plastics or even fishing nets.

Synthetic fibres are man-made materials such as nylon (polyamide), polyester (PET) and polypropylene (olefin) and are most commonly used in carpet production. Alternative, natural fibres such as sisal, jute, coir and seagrass are growing in popularity, partly because they can be grown without chemical input and are naturally antimicrobial. However, natural fibres such as these can be susceptible to moisture so may not be suitable for humid climates.

Wool has strong insulative potential and is also naturally antibacterial. The practices and environmental impacts of sheep farming in different countries vary greatly, depending on the climate and what else the farm is producing. Land and water use, methane pollution, and soil degradation through acidification and eutrophication are also potential issues.

Both natural and synthetic materials can require energy intensive manufacturing processes, and all fibres will vary in grade and quality. Though natural fibre products can be more environmentally friendly than synthetics they can also be less durable, and obviously frequent replacement of flooring defeats the environmental objective. A true comparison on material type would need to be context-specific based on an LCA of materials, production, use and replacement and end-of-life considerations. The type of fibre used in a carpet will contribute to its durability,

flammability, pile retention, colour fastness, stain resistance and pest resistance.

While some fibres such as wool have inherent characteristics like high UV protection and ignition thresholds, making them fire resistant, other fibres require additives. Chemicals are often used on carpets to provide or improve dust, mould, stain, flame and insect resistance. The ‘new carpet’ smell we’re all familiar with is essentially volatile organic compounds (VOCs) being emitted (but it is also important to note that VOCs do not always have an odour). While wool fibre has been reported as being able to absorb and trap VOCs this is not the case for most synthetic fibres.

CARPET BACKING AND UNDERLAY

Carpet backing is placed underneath the carpet to provide longer life, additional comfort, insulation, and noise reduction. In some cases a cushioned secondary backing is integral to the carpet backing. The backing material of a carpet also contributes to its sustainability and VOC emissions. For example, rubber backing, while a good insulator, tends to have higher VOC emissions than jute fibre. PVC backing with 100 per cent recycled material is available and used by some manufacturers, but is not yet standard. Foam backing is also popular and is cheaper but less hardwearing. Felt backing, produced from plant fibres, which is also insulating and soft underfoot could be a good option. Fibre treatments listed above also have the potential to release emissions into indoor air over time.

Chemical adhesive used during installation is often toxic and can off-gas. It is also a key inhibitor to sustainability as it limits carpet removal and reuse. Non-toxic adhesives and adhesive-free pressure application systems are available, but may not be offered by all manufacturers.

CERTIFICATION PROGRAMS

There are no specific import standards for carpets in Australia, and while the general requirement under Australian Consumer Law is that products must be durable, safe and fit for their intended purpose, in reality laws do not require carpet imports to be accompanied by full documentation. →



Tretford produces a blended goat hair carpet which is also available in custom rug format such as this design by Fiona Lynch, which has GreenTag’s Silver Plus and GreenRate Level A ratings.






The Carpet Institute of Australia administers the voluntary Environmental Certification Scheme for carpets, measuring cradle to grave impacts of the product.



Ingredients of concern in carpets made to inferior standards may include banned dyestuffs such as AZO dyes that have been found to be toxic, or fibre chemical treatments not accepted or tested as safe in Australia.

Independent certification programs can assist with navigating product choices. The Carpet Institute of Australia runs a voluntary grading system, the Australian Carpet Classification Scheme (ACCS), available to all companies local and abroad as well as the voluntary Environmental Certification Scheme for Carpets. All participating companies must meet performance standards for raw materials, manufacturing, installation, use and final disposal and recycling or reuse. The Environmental Certification is a four-level program, with producers certified above level 2 able to contribute to Green Star building ratings.

Other certifications that carpets can carry include the Woolmark/Woolblendmark label and New Zealand's Fernmark label for wool content.

There are many certification programs around the world that assess products to varying standards. To avoid greenwashing, read the certification criteria to understand what characteristics have been assessed. If a product has a 'green certification', this does not necessarily mean it is a healthy product option. For example, a product may be made with renewable materials in a resource-efficient way yet still have high VOC emission levels. The Environmental Certification Scheme for Carpets mentioned above does consider total volatile organic compounds, and the Carpet Institute of Australia provides a list of certified carpets and suppliers at their website. Other organisations in Australia that certify environmentally friendly carpets and floor coverings are Good Environmental Choice Australia (GECA) and Eco Specifier. Unfortunately the current voluntary nature of product assessment leaves many consumers in a vulnerable position. It would be great to see industry product assessment in this sector become mandatory so that consumers can make informed decisions about a product's materials, quality, sustainability and health credentials based on testing outcomes displayed on labels. 

TIPS FOR BUYING AND OWNING CARPET

- Ask questions about: where and how the carpet was made; transportation required; raw material use and sourcing; additives and treatments used; VOC emissions testing; independent certification; installation requirements; maintenance and warranty period; end of product life programs
- Choose colours, textures and patterns that will transcend fashion
- Opt for manual installation or fixing methods rather than adhesives to avoid pollutants and VOCs
- Keep a record of the manufacturer, carpet name or code (batch code if possible, as colours can vary), grading registration number, retailer details, type of underlay used, date of purchase, installation date and purchase receipt in case of warranty or insurance issues in the future
- Consider UV protective window glazing, curtains, blinds or awnings to protect carpet from prolonged periods of direct sunlight – this will help minimise colour fade and deterioration
- Keep windows and doors open for as long as possible at installation to air the carpet and reduce VOC pollution
- Use furniture cups to protect carpet from compression under furniture legs
- For people with allergies or chemical sensitivities, investigate individual products, fibre characteristics and maintenance needs before purchase.

LINKS

www.carpetinstitute.com.au

www.geca.org.au

www.ecospecifier.com.au



Living buildings



WORDS

Caroline Pidcock

Caroline Pidcock is director of Sydney-based architecture firm Pidcock – Architecture and Sustainability. www.pidcock.com.au

Caroline Pidcock introduces a building standard that goes several steps beyond basic passive solar performance and energy efficiency, aiming to diminish the gap between current limits and ideal solutions.

AS A SANCTUARY READER, I KNOW YOU ARE LOOKING FOR ideas for your home that will make it a wonderful place for you and your family to live. How would you feel if your actions to improve your living space could also help you be part of a bigger, inspiring movement that aims to create a “socially just, culturally rich and ecologically restorative” future for us all?

Developed in the USA and launched in 2006, with the first buildings certified in 2010, the Living Building Challenge (LBC) is a rigorous performance standard for the built environment. It calls for the creation of buildings that “operate as cleanly, beautifully and efficiently as nature’s architecture”.

Going beyond basic considerations of building sustainability, the LBC is a framework for our built environment that asks what a true sustainable answer to our housing and lifestyle challenges actually looks like. And how is a new approach going to be positive

and regenerative? Happily, the framework guidelines are also poetic and inspiring, recognising the importance of beauty and delight in achieving sustainable outcomes.

It should be acknowledged that it is called the Living Building Challenge because it is a challenge. There are many considerations it raises that in today’s world are not standard practice, and need to be approached in ways that are outside the normal way of thinking and doing. The Challenge asks you to imagine “a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion’s characteristics, that generates all of its own energy with renewable resources, captures and treats all of its water, and that operates efficiently and for maximum beauty.”

Wow. Not just less bad – but truly good and beautiful. And inspiring. →



The Bull Street Terraces aim to provide an alternative development model that doesn't add to urban sprawl. The design includes a productive north-facing roof deck as part of the LBC requirement for 25% of the site to be used for agriculture. The terraces will have a near net-zero energy production and a zero carbon footprint. The project is one of only around 10 in Australia that have registered for LBC accreditation.

What does this mean for your own home? At the very least, it provides a framework for thinking through the whole project to ensure you are covering all the necessary elements for a comfortable and high-performing house for the long term. It helps extend the boundaries of what you believe can be achieved. As Michelangelo said, "The great danger is not that we aim too high and miss the target, but that we aim too low and hit it".

If you do embrace the LBC principles in the planning and construction of your home, you can apply for Living Building certification. To be certified under the Challenge, projects must meet a series of ambitious performance requirements in seven categories called Petals: Place, Water, Energy, Health & Happiness, Materials, Equity and Beauty. A number of these are unique to the LBC approach, and they are indeed challenging! I would like to share some of the key LBC considerations with you.

PLACE

Projects may only be built on previously developed sites that are not impacting on sensitive ecological habitats. This is in recognition of the fact that the human race has taken more than its fair share of habitat around the world already, and we need to leave what is left for other species and food production. In addition, the project must ensure the place is improved through the project's implementation.

A Living Building must incorporate "place-based solutions and contribute to the expansion of a regional economy rooted in sustainable practices, products and services." A good building should assist in strengthening the community it is in and reflect the skills and materials that are locally available. It can then be more grounded in its place.

FOOD PRODUCTION

To help reduce the pressure on habitat around the world for food production, every project needs to integrate appropriate opportunities to grow food for its occupants. This may involve thinking creatively about roof and wall as well as ground level gardens.

TRANSPORT

Each project must contribute to the creation of cities that are designed around people and at a human scale, and reduce the need for cars. For our homes, firstly it's important to select the location for its proximity to places visited regularly; then to work out how we can reduce the impact of our necessary transportation through car share, bicycle use and public transport.

WATER AND ENERGY USE

An LBC project must aim to capture and naturally treat at least as much water as the occupants require, while having a positive impact on the water ecosystem in which the project is placed. This will allow us to be water independent. When coupled with good storage systems and design, we can create systems that continue to work even after a catastrophic climate event such as a cyclone or bushfire – further resilience. Living Buildings should also strive for energy independence. This means we should identify how much renewable energy can be harvested on site, and shape the size and design of the building around this so that we produce more energy than we need.

HEALTH

A healthy internal environment is fundamental to any good building. Creating environments that optimise their occupants' physical and psychological health and wellbeing starts with things as simple as having openable windows in every room that provide access to fresh air and daylight. In addition, of course, healthy buildings should not use any toxic materials or chemicals. While this sounds obvious, it is astounding how many standard building materials contain toxic substances, and how few manufacturers are prepared to be transparent about what their products contain. An initiative of the International Living Futures Institute, the Declare label is an ingredients label for building products and has been developed to assist us in understanding the true background to and makeup of materials.





Geoff Crosby's planned 9 Star townhouse development for Castlemaine in central Victoria has been guided by the Living Building Challenge, and will apply for the certification once it has been occupied for a year. The project website will document its progress in an effort to assist others considering a similar approach: www.bullstreet.com.au.





The University of Wollongong's Sustainable Buildings Research Centre is the first in Australia to be seeking and tracking full Living Building Challenge certification. Image by Noel Downey.

Within the health qualification there is a requirement to include elements that nurture the human-nature connection. Biophilic design works on the basis that human health and wellbeing has a biologically based need to affiliate with nature. To achieve a design that takes our health and wellbeing seriously, we should begin the process with consideration of how biophilic design can positively influence the whole process.

EQUALITY AND INCLUSIVENESS

The LBC's Equity Petal states that the built environment of the future must foster an inclusive, just and equitable community. "A society that embraces all sectors of humanity and allows the dignity of equal access and fair treatment is a civilization in the best position to make decisions that protect and restore the natural environment that sustains all of us."

Participating businesses are called on to meet these ideals in the following ways:

- Make contributions to charities so the disadvantaged communities they work with can also enjoy renewable infrastructure such as solar panels or windmills;
- Demonstrate fair and equitable business practices.

BEAUTY

Importantly, Living Building Challenge projects should be beautiful! This will encourage people to love and care for them, giving them the greatest chance for long, low impact lives. They and their creators should also sing loudly and widely about what they have achieved so others will be inspired to stand on their shoulders and go further.

HOW TO GET YOUR BUILDING LIVING

The first step in achieving Living Building Challenge certification is to register your project. Once the building is complete and a full year of performance data under normal occupancy has been recorded, it's possible to apply for LBC certification. While no one has achieved the accreditation in Australia yet, there are already around 10 projects in Australia that have been registered with the LBC, and one that is actively seeking certification, the University of Wollongong's Sustainable Buildings Research Centre.

A truly sustainable project will have a collaborative team that is positively engaged with each other from the beginning, and any one of them can register the project. However, there are many projects that come to the LBC a little later and still manage to work with it in very productive ways. The Living Future Institute of Australia (LFIA) was established in 2012 in part to help the Living Building Challenge take root in Australia, and provides courses, advice and a supportive community for anyone wishing to undertake an LBC project.

While this might sound challenging and hard (which it is), the Living Building Challenge aims to set out the sort of future we need to create. While achieving full LBC Petal certification is ideal, partial certification is also possible. Even where certification is not possible, considering the Living Building Challenge framework will provide lots of ideas for making your home better than it is already.

The future can be great – we just need tools such as this to help guide our creativity in making it happen!

This is adapted from an article which first appeared on www.liveability.com.au

LINKS

Living Building Challenge: living-future.org/lbc

Living future Institute of Australia: living-future.org.au

Declare label: declareproducts.com

ATA update

—Alternative Technology Association: www.ata.org.au

The ATA, publisher of *Sanctuary* magazine, is a not-for-profit organisation that exists to enable, represent and inspire people to live sustainably in their homes and communities. Stay up to date with ATA news, subscribe to the ATA newsletter online at www.ata.org.au



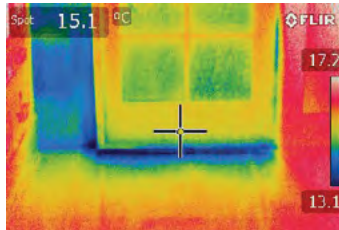
ATA NEWS



Image by Negley Aspelng

EV EXPO

What a fantastic day it was on Sunday 19 April at the ATA's Melbourne Electric Vehicle Expo at Swinburne Uni. Over one thousand people crowded the venue (despite the cold and rain), checked out the EVs, talked to the experts, enjoyed test rides and had fun. There were many conversions on display in the 'show and shine' section, along with test drives of a Nissan Leaf, Mitsubishi Outlander, Holden Volt and a range of electric bikes.



ATA BRANCHES

Why not get involved in the ATA? ATA has member branches around Australia involved in activities such as running monthly seminars on all things sustainable and visits to sustainable homes and projects. Recent branch events include an explanation of thermal imaging, and how it can be used in building inspections, and a presentation from the ATA's Craig Memery about putting energy back in the hands of communities.

community.ata.org.au/branches



SPEED DATE A SUSTAINABILITY EXPERT

Are you renovating or building and looking for environmentally friendly options? Thinking about solar power or solar hot water? Redesigning your garden or wanting to create a rooftop garden? Get advice and tips from Australia's leading green architects and experts on energy-efficient products, solar, green roofs and more at Speed Date a Sustainability Expert events run by the ATA.

sdse.ata.org.au

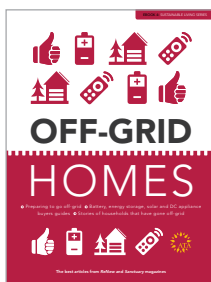
ATA SHOP - SHOP.ATA.ORG.AU



COOL HOMES EBOOK

ATA's *Green Home Cooling* eBook contains the best articles from *ReNew* and *Sanctuary* magazines on how to have a naturally cool and energy-efficient home. Find out how to passively cool your house, how windows and insulation work to improve indoor comfort, and about the most energy-efficient active cooling systems.

Price: free to ATA members, \$5 for non-members.



OFF-GRID EBOOK

The *Off-Grid Homes* eBook is a compilation of the best articles and buyers guides from *ReNew* and *Sanctuary* magazines on how to have an energy-efficient off-grid home. Find out the steps to going off-grid, learn about urban off-grid options and read stories from households that have made the switch to off-grid living.

Price: free to ATA members, \$5 for non-members.



RENEW 131: ELECTRIC VEHICLE SPECIAL

Electric vehicles (EVs) may be about to take off in Australia, the latest issue of *ReNew* looks at every aspect of their operation. It covers basic EV concepts, EV charging and where the Australian EV market is heading. *ReNew* 131 also covers solar financing, an off-grid home in WA and a Battery Buyers Guide, for those looking to go off-grid or get battery backup for their PV system.

Price: \$8.95.



Products



01

ODETTE LAMP

The Odette Lamp has been crafted using salvaged glass insulators, copper pipe (recycled or seconds when available), scorched Tasmanian oak and reclaimed climbing ropes, giving it a distinctly vintage feel. With a commitment to local-sourcing, designer Harry Brown takes inspiration from nature's organic forms to fuse the old and the new, with exciting results.

The Odette Lamp is powered by a low voltage 12V plugpack and is designed to be used with LED globes. Each handmade light comes with a personalised video of its construction, giving a window into how each heirloom piece is put together from humble beginnings. The Odette Lamp comes in both copper and patina finishes. Price \$270.

www.ignisinception.com/product/the-cygnet-lamp

02

SISAL FLOORING

Once used by the Aztecs, sisal has emerged as a low-impact and versatile alternative to standard carpeting. Taken from the agave succulent, and produced without pesticides or chemicals, the carpet is also biodegradable if left outside of landfill. Organic leftovers from processing are also used to produce recycled paper.

Sisal is naturally antimicrobial, and so is suitable for people with allergies. Sisal can be installed wall to wall or in rug format, with a variety of colours and textural weaves available for a neutral accompaniment to a range of interior styles. Prices start from \$45.50 per square metre.

www.floorspace.com.au





03

WOLLEMI PINE FABRIC

Using the distinctive pattern of the Wollemi pine cone as inspiration, artist Julie Paterson has fashioned a durable, modern fabric punctuated with colours of the natural world. Cloth Fabric uses the colours and textures of the Blue Mountains as the starting point for each design, with each pattern screen-printed by hand onto unbleached, heavyweight raw hemp. The final product is ideal for upholstery or soft furnishings throughout the home, adding a toned-down, local touch. Proceeds from the sale of the Wollemi Pine Collection are being donated to the Foundation for National Parks and Wildlife. Price \$160 per metre (printed width is 137cm).

clothfabric.com/products-page/furnishing-cloth/wollemi-pine-3-2

04

LOOMI BULBS

Melbourne-based LED lighting company Loomi has engineered a way to merge classic aesthetics with modern technology – creating an atmospheric bulb you won’t want to hide under the lampshade. With a lifetime of 25,000 hours, the Loomi Tru-Colour bulbs emit a warmer, broader spectrum light, to mimic old-school incandescent bulbs without the wastage. Running on two watts for the smaller bulbs and four watts for the largest, the bulbs can add ambience any environment, emitting between 200 and 400 lumens per bulb. Available in a number of shapes and sizes, the Loomi bulbs are priced from \$19.

www.loomi.co/lights





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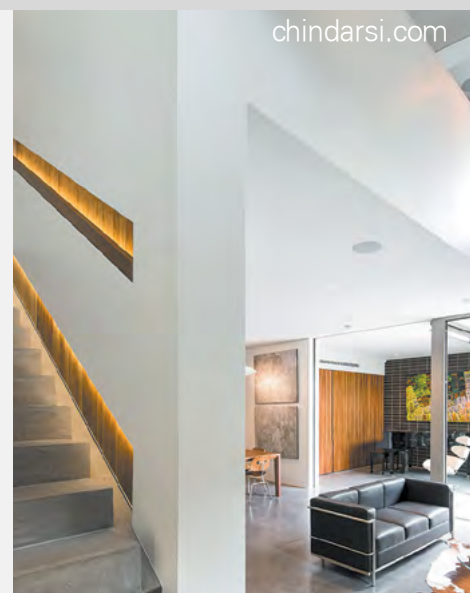
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Ask our experts



Dick



Damien

Your design, product and specification questions answered by our expert columnists.

Dick Clarke is principal of Envirotecture, a sustainable building design firm in Sydney and Redland Bay, Queensland. www.envirotecture.com.au

Damien Moyses is the ATA's Policy and Research Manager. He holds qualifications in urban and regional planning and environmental management, and has worked for government in Australia and overseas, as well as for the private sector.

Q— *I have a double brick house built around 1937/38 in Hobart. It has a good floor plan and lots of sun. However the wind whistles through a vent high up in the walls in every room of the house. A builder recommended that I cover over each vent on the inside walls, leaving the vents exposed to the elements on outside walls.*

But another expert warned that if I close off the vents internally I may risk condensation, an even bigger problem. So now I don't know what to do. And I do want to improve the thermal efficiency of the house.

Anne, Hobart

A— The advice received from both builder and expert is correct! How can this be?

The vents were traditionally installed near ceiling level on external walls, corresponding to external vents in the outside skin, and often vents at about floor bearer-level in the outside skin only. These perform an important function in venting, and thus drying out, the wall cavity and the subfloor. They also provide a permanent internal air exchange, reducing condensation, and in the aftermath of the 1918 flu epidemic, significant health benefits. There is no need to change the external vents, unless you choose to insulate the cavity itself, which changes the way the building works altogether (with many benefits, but not discussed further here).

If you seal up the internal vents you need to re-introduce internal air management by one means or another.

It can be as simple as opening windows during the warmest (or least cold) parts of the day. This is easy in summer, but can be much harder in winter! But importantly, you only need to vent the house for a short period, so the internal thermal mass in the walls will not be lost.

Or you could install a heat recovery ventilation system, such as the Air Change ERV-IC 70 domestic scale unit), which force changes the air but also exchanges the heat energy on its way in and out, thus providing fresh pre-warmed air. This is assisted greatly if you have an effective and energy-efficient heating system.

www.airchange.com.au/products-projects/products/ventilators/erv-ic-70/

– Dick

Q— *We are currently renovating a heritage-listed home in Port Melbourne. We would like to install solar panels, which would be visible from the street. This seems to be a huge “no go zone”. Are there any panels on the market blending in with a grey tin roof? Is there anything we could/should do to change the possible disapproval of solar panels on heritage-listed buildings? Any hint, idea or advice would be highly appreciated.*

(We plan to install triple-glazed windows and an underground water tank – trying to demonstrate that inner city renovations can be done sustainably.)

Angelika, Bentleigh, VIC

A— If you have a grey tin roof it is relatively likely it's not the roof that is the basis for the heritage restriction, but another part of the building fabric/construction/design.

While all commercially available panels would be visible when placed on a grey tin roof, the visual impact should be much less significant than on a heritage-style tiled roof. And while the provisions of the heritage policy no doubt discourage changes to the street frontage-side of the property, it may well still be worth going through the application process and arguing along the lines of lack of visual impact.

Also, there is Victorian Civil Administrative Tribunal precedence of council-refused solar-on-heritage applications being over-turned on appeal – on the basis that the sustainability policies are equally as important as the heritage policies within the planning scheme.

I would also suggest trying to speak to a heritage or planning advisor at your council to get an understanding of the process and the types of things that they are concerned with before lodging your application.

In terms of low visual impact or roof-integrated solar products, there are few commercially available products at this stage, though there is ongoing research in the area. BlueScope is trialling integrated photovoltaic roofing technology on architect Tone Wheeler's home in Sydney.

– Damien



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