

# 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

## MODULAR & PREFAB SPECIAL

+  
Tiny homes  
Design on a budget  
Salvaged for second life

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# MODERN GREEN HOMES Sanctuary

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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

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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.

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**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.”

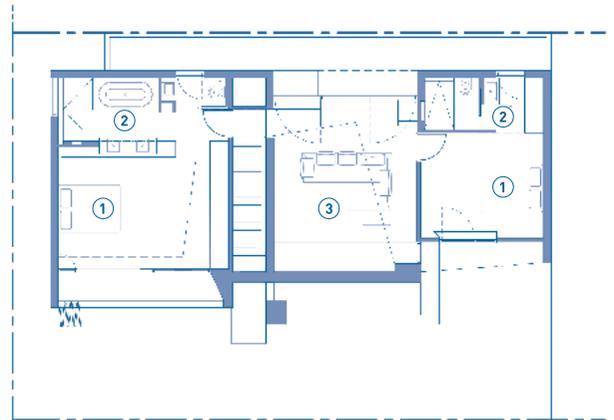
5

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.

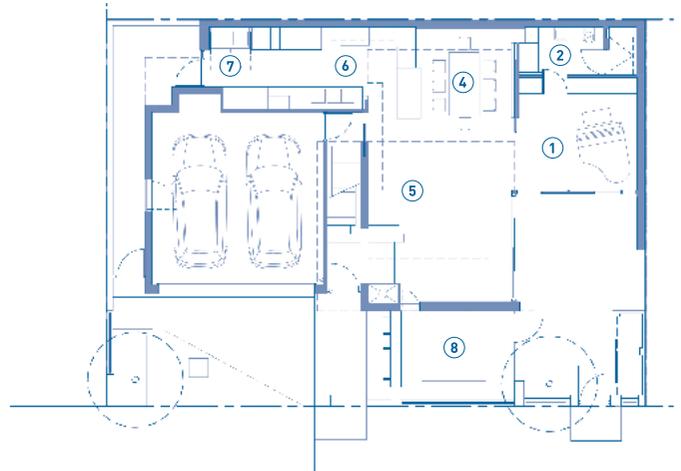


① The courtyard on the north-east corner of the house is sheltered from the weather, creating a warm and dry retreat in winter, and shade from the western sun in summer. The mature deciduous frangipani allows winter sun through the wide openings to the internal concrete slab.

FIRST FLOOR PLAN



GROUND FLOOR PLAN



LEGEND

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

# Recycled house

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

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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.” 📍



# 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](http://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](mailto: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.



## Products

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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](http://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](http://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](http://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](http://www.loomi.co/lights)

