MODERN GREEN HOMES

Sanctuary

ISSUE 53 | PREFAB & MODULAR SPECIAL

Retrofitting for bushfire resilience; prefab home offices; create a native food garden; roadmap to carbon zero homes

QUICK, EASY, ECO

THE PROMISE OF PREFAB

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Inside issue 53

HOUSE PROFILES

35 Prefab & modular special

We visit a collection of sustainable homes that make the most of prefabricated and modular construction to deliver high-performing homes while cutting building time and minimising waste.

Image: InOutside

IDEAS & ADVICE

REGULARS

Sideways step

LOCATION Goodwood, SA • **WORDS** Rebecca Gross • **PHOTOGRAPHY** Mitchell Lowe

At a glance

- Modest extension for improved liveability
- Living space admits northern light and opens to established garden
- Almost all the existing house retained
- Increased energy efficiency and reduced bills

A 35-square-metre addition to the side of this Adelaide house brings in northern light and has dramatically changed the way the homeowners live in their house.

Houses are often extended rearwards or upwards; seldom sideways. But space allowing, a side extension is a clever way to bring in northern light for a house with a south-facing backyard. Troppo Architects added a living room to the side of John and Jan's house in Adelaide, as well as reorienting the kitchen and dining room, and it has changed the way the couple live in their house. "We only added 35 square metres and we effectively have an entirely new house. It was a very clever piece of work," says John.

Jan and John bought their 1890s stone house in 1990, and added a rear brick extension, with a kitchen, dining and living area. Their children have since moved out and the couple are now spending more time at home; they wanted an environment they absolutely loved living in. With a south-facing backyard, the house only received northern light into the front bedrooms, making the living spaces cold and dark. "With busy working lives we were less concerned about light and warmth during the day, but now they have both become key to us enjoying the house," John says.

The couple engaged Troppo Architects to improve the living environment with a design process that explored what could be achieved for various budget points. They initially didn't want to extend beyond the existing footprint, but Troppo demonstrated how a side addition would achieve the best outcome, while still minimising the increase in footprint to retain as much garden space as possible. "It was a good process to go through as we got to the right option without leaving any stone unturned," says Tain Patterson, senior architect at Troppo.

The project included keeping as much of the existing house as they could: "Minimal demolition and minimal disturbance to the site was important," says Tain. Only part of the walls and ceiling of the 1990s-era addition were removed; the remaining brick walls and concrete slab were reused and the footprint of this rear area was extended onto the site of a redundant shed earmarked for removal, which meant almost no disruption to the garden. John and Jan's son reused the timber window frames and kitchen joinery, and their

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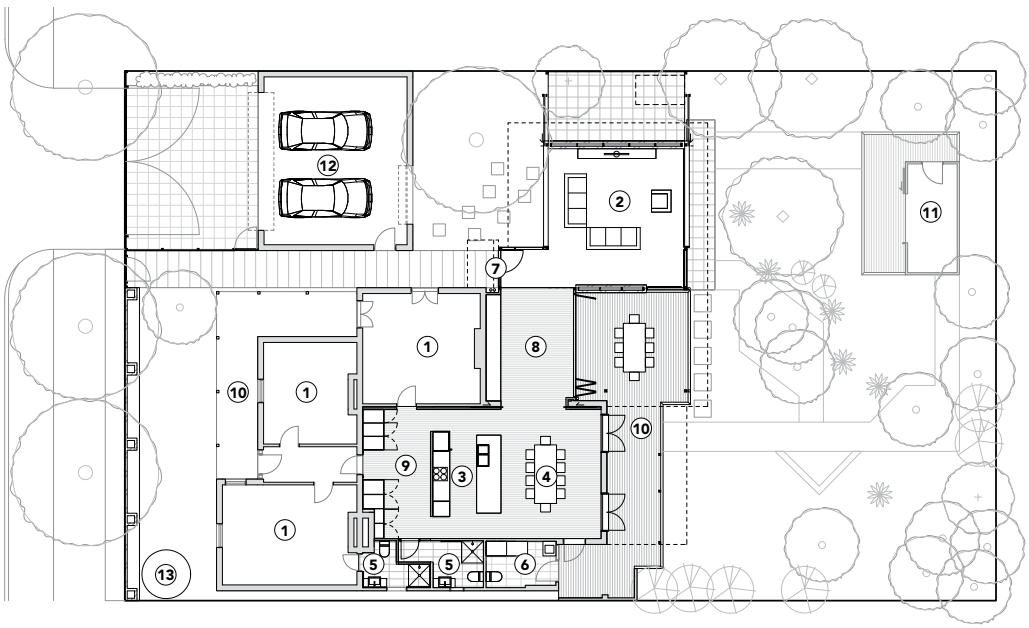
The openness of the lounge and being surrounded by garden allows for greater awareness, observation and connection with nature, including the sounds of birds, wind and rain. “We can watch nature happen right in front of us. It’s significant for wellbeing and feeling at peace with the world,” says homeowner Jan.

The kitchen and dining area now face the verandah and garden, and a large amount of easily accessible storage is behind the kitchen, right in the centre of the house so that it serves all zones conveniently and keeps the rooms clutter-free. A skylight with double glazing and blind brings natural light into the centre of the house, illuminating the storage area and filtering into the kitchen.

At the front of the property, a new limestone wall with timber batten gate provides privacy and acoustic protection and has created a north-facing garden where John and Jan now enjoy sitting. “This is a house we absolutely love to be in. We sit in different parts of the house and garden at different times of the day and year, choosing comfortable places depending on light and temperature,” says John.

FLOOR PLAN



LEGEND

1. Bedroom
2. Living
3. Kitchen
4. Dining
5. Bathroom
6. Laundry
7. Entry
8. Gallery
9. Pantry
10. Verandah
11. Studio
12. Garage
13. Water tank

SPECIAL

QUICK, EASY, ECO

THE PROMISE OF PREFAB

The recent pandemic lockdowns and, for many, a shift to working largely from home have already seen an increasing number of people looking to move out of our cities. No doubt, many are dreaming of a sustainable home built quickly on their new blocks. Prefabricated or 'off-site' construction could be the perfect solution.

Long established on a large scale in many parts of Europe, the prefab industry in Australia is still relatively young. However, despite making up only a small percentage of the residential housing market, prefab construction is attracting more and more interest for its clear benefits – including speed of construction, efficiency and waste minimisation – and our home-grown prefab companies are innovating fast.

These days, there is a wide range of offerings: from 'off-the-shelf' homes to high-end custom designs, employing kit-style, panelised and 3D modular construction methods (and sometimes a combination), executed in a variety of materials, and available at a range of price points. And when due consideration is given to material selection and passive solar design, the controlled factory environment of prefab construction lends itself extremely well to the creation of sustainable, energy-efficient homes. For an in-depth look at the options, pros and cons of prefab, see 'Modular synthesis: A prefab buyers guide' in our sister magazine *Renew*, issue 153.

In this special feature, we visit five homes around Australia and one in New Zealand that make the most of different prefab and modular approaches. On a range of sites from tight urban corners to seaside blocks and off-grid acreage, these quick, easy and eco-friendly builds neatly demonstrate the promise of prefab.

Eco Studio by Ecoliv; image: Coastal Snaps

Riverside retreat

LOCATION Bulahdelah, NSW • **WORDS** Rebecca Krispin • **PHOTOGRAPHY** Edge Commercial Photography

At a glance

- Small flat built with minimal disturbance to established garden
- Hybrid prefab system with modular pods for wet areas and panels elsewhere
- Standardised, reconfigurable panels give future flexibility
- All-electric, energy-efficient design

This elevated granny flat on the Myall River in New South Wales was built using a hybrid prefab system – a fast, simple and affordable solution for a site with several constraints.

Semi-retired couple Jeff and Jane Carryer built this appealing prefab granny flat on their property by the Myall River in Bulahdelah in New South Wales' Great Lakes region in 2018. "We wanted somewhere for my 93-year-old mum to live in the future, with the versatility of being able to use it for short-term accommodation or for family and friends, that was reasonable in cost and could be done quickly without major disturbance to our gardens and neighbours," says Jeff.

The flat had to be affordable and achievable within the constraints of their property, which is in a flood zone, has a BAL-12.5 bushfire rating, is on a slope and is difficult to access for heavy machinery. They also wanted it to be low maintenance and energy efficient, and the exterior design had to fit in with the sleek lines and raised level of their existing house.

Keen to support local businesses, Jeff took the project to Bulahdelah designer Daniel Reitsma of MAAP House (Modular Architectural Adaptable Panels). Jeff quickly realised that the MAAP building system ticked all of their boxes. He expected to have difficulty obtaining a building permit due to the flood zoning, but due to MAAP House's approach of building their projects raised above the ground on steel piers, this was not an issue. The system also put the flat at the same level as the house and dealt with the slope, as well as delivering other advantages such as making it easily adaptable for changing needs in the future.

MAAP House uses a hybrid prefab system using both modules and panels, designed to be easy to transport and install. Bathrooms, kitchens and laundries are built in the factory and delivered to the site as completed pods, which are lifted in with a small crane. The rest of the house is assembled on site from flatpacked MAAP floor and wall panels and Versiclad structural insulated panels (SIPs) for the roof. MAAP's panels come fully lined, insulated, painted and fitted with electrical cabling and are of standardised sizes; for example, wall panels are 1.2 metres wide and 2.7 metres high and can be either a plain wall section, a door section or a window section. Wall and floor panels can be installed by just a

The flat had to be affordable and achievable within the constraints of the property.

Inspired by tramping

LOCATION Waihi, New Zealand • **WORDS** Rachael Bernstone • **PHOTOGRAPHY** David Straight

At a glance

- Small family home with separate home office and large covered 'outdoor room'
- Prefabricated timber frame construction with cross-laminated timber (CLT) floor panels
- Built for excellent thermal comfort and energy efficiency

A love of the New Zealand bush and simple walkers' huts was behind the design of this family's small prefabricated home in southern Coromandel, built with Passive House principles in mind.

Sarah and James used to live on the coast at Waihi Beach, 100 kilometres south-east of Auckland on New Zealand's North Island, but really considered themselves 'freshwater people'. Lovers of native forests, they particularly enjoyed spending time in the nearby Waitawheta River valley. "There is a Department of Conservation track that runs through local farmland, and we used to run along it regularly," Sarah recalls. "We used to say 'Wouldn't it be amazing to be able to buy in this valley?', but there are very few properties available."

So when they heard through a friend that a local landowner was subdividing, selling a 10-hectare parcel adjacent to the Kaimai-Mamaku Forest Park with river frontage on its southern boundary, they made contact and agreed to purchase the land privately.

That was in February 2016, and James and Sarah moved into a dilapidated worker's cottage on the land. They restored it over several years, during which time their daughter was born. "We stripped out the house and lived without lining and insulation over winter," recalls Sarah. Now finished, it brings in short-term rental income.

At the same time, they engaged Auckland-based MAKE Architects to design and deliver a prefabricated new home in the style of a trampers' hut, that would be comfortable all year round and efficient to run.

"We'd been investigating the Passive House system for high-performing houses, and MAKE had already worked on a similar house with a Christchurch-based prefab company, so we knew they understood the philosophy," Sarah says. "Then it turned out that I'd gone to Sunday school with both of the directors when we were younger, although I hadn't seen them for more than 25 years."

Another key design objective was the couple's desire to build a small house, to reduce the cost and duration of their mortgage. "Also, we knew it would just be us three and we don't need a lot of space – we don't have a lot of stuff – and we didn't want to create space just to have to clean it," Sarah says.

"One of the main reasons we used

HOUSE SPECIFICATIONS

HOT WATER
- Rinnai electric storage hot water system

WATER SAVING
- 2 x 2,500L poly rainwater tanks plumbed to whole house
- Low-flow taps and showerheads

PASSIVE DESIGN, HEATING & COOLING
- House positioned for views and northern and eastern solar access
- Covered 'outdoor room' can be opened up or closed off to control breezes
- Covered decks to east and north for summer shade
- Layout and positioning of windows designed for natural cross ventilation

ACTIVE HEATING & COOLING
- Lunos mechanical ventilation with heat recovery (MVHR) systems: Lunos e3 in bedrooms and office and Lunos Nexxt in living area
- Wagener Leon wood-burning stove

BUILDING MATERIALS
- Prefabricated construction for waste minimisation and on-site build efficiency:
  - Floors: CLT (cross-laminated timber) insulated panels
  - Walls and roof: radiata pine panels with Plytech FSC-certified birch plywood RAB (rigid air barrier) and Pro Clima Solitex Extasana building wrap on the outside, bulk insulation, and Pro Clima Solitex Intello wrap on the inside
- Cladding: Abodo Tundra FSC-certified NZ plantation grown Douglas fir
- Internal lining: FSC-certified birch plywood from Plytech International
- Insulation: NZ-made Terra Lana Wool Blend batts in wall and roof panels (total R3.6); Terra Lana Acoustic batts in internal bedroom walls; Expol Underfloor (R1.4) under floor panels
- Roofing: True Oak Corrugate from Roofing Industries

WINDOWS & GLAZING
- Aluplast double-glazed tilt-and-turn windows and glazed doors with uPVC frames from NK Windows

LIGHTING
- LED lights from Mr Ralph Lighting

PAINTS, FINISHES & FLOOR COVERINGS
- SiOO:x 100% natural wood coating to external cladding
- WOCA Denmark low-VOC Diamond Oil Active to all interior timber

DESIGNER
MAKE Architects NZ

BUILDER
Carl O'Neil Builders

PROJECT TYPE
New build

LOCATION
Waihi, New Zealand

COST
NZ$485,000 inc GST
(approx AU$452,000)

SIZE
House 100m^2
Outdoor room 20m^2
Land 9.84 hectares

INSIGHTS
"There is generally no cost benefit to prefabrication, despite the common perception that prefab is cheap. A prefab home is built using the same materials and requires a similar length of time to put together, but the advantage is that most of that's done in a controlled environment, minimising waste and maximising efficiency, and the parts are dry and wrapped for transport."

Martin Varney, architect

JUST ADD SPACE:

Sustainable, prefab options for backyard offices and studios

WORDS Belinda Smart

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InOutside offers DIY flatpacked cabins in four sizes, and 'outdoor rooms' such as the Cooba (pictured here) that are available installed 'to lockup' or 'full installation'. You can also design your own custom build using their proprietary software. Double glazing and insulation are available as extras, as is a full planning and approvals package. Based in Melbourne and Adelaide. www.inoutside.com.au

A widespread pandemic requirement, working from home is likely to remain a more common arrangement for many of us even as we achieve 'Covid-normal'. While a desk in the bedroom may have been enough in the short term, a dedicated office space might be starting to look like a good idea, and there are plenty of prefab cabins, studios and office pods out there. We asked some leading suppliers what you need to consider for a 'quick and easy' installation that also ticks the energy efficiency and sustainability boxes.

Backyard offices and studios are nothing new, but the pandemic has triggered a surge in demand among homeowners keen to reinforce the boundary between home and work life. Of particular interest are prefab solutions for their quick installation. With a host of options on the market, from DIY kits to ready-to-occupy buildings delivered by crane, there is also a range of factors to consider in making the selection that's right for you.

FROM PURPOSE TO REPURPOSE

Office space might be your current priority for this new build, but before you opt for something just big enough for a desk, it's worth considering its broader potential. Does it make sense to design the space to meet more than one need,

BUILDING A LOW CARBON FUTURE:

The Builders Declare movement and the path to carbon zero homes

WORDS Jeremy Spencer

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Cost-effective, comfortable carbon zero homes are achievable already; this 8.5-Star family home in St Kilda East, Victoria, by Positive Footprints, is a great example of following the roadmap. Builders Declare aims to spread the knowledge to take high performance mainstream. Images: Dianna Snape

Australian builders have formally moved to declare a climate and biodiversity emergency, following hot on the heels of architects and engineers in 2019. Founding member Jeremy Spencer outlines a simple roadmap to making carbon zero homes mainstream, the core aim of the Builders Declare movement.

Change is coming in the building world, and it may be sooner than you think. What do we need to do to move to the holy grail of homes that produce as much energy as they use, including embodied energy? What will it take for domestic construction to move to carbon zero?

Let's look at what we already have:

- When I started Positive Footprints back in 2001, finding double glazing was a challenge. Now all window manufacturers have a range, prices are competitive, and clients are coming to expect it as standard.
- Incandescent downlights were the rage. Now efficient LEDs are ubiquitous and pendant lighting is the trend.
- Air conditioners were energy-guzzling monsters. Now they are so efficient, they are the darlings of the sustainability movement. And the same heat pump technology that has revolutionised space conditioning has also come to hot water systems.
- The range of insulation products like sisalation tape and expanding foam was smaller and they sometimes needed to be ordered specially. Now there is a wide range on the shelves at hardware stores.
- Gas was good and electricity bad. Now it's the other way around, with all-electric homes making it easier for owners to know exactly how much energy they are using.
- Appliance energy consumption was poorly labelled. Now we have a robust star rating system for many appliances, making efficient choices easier.
- Solar PV panels were expensive. Now you can buy a 10-kilowatt system for the same price as my first 1.5-kilowatt setup.
- Sustainable homes were truly niche. Now *Sanctuary* magazine, Sustainable House Day, and others have expanded community awareness, and the number of sustainable designers and architects has blossomed.

Looking at this list, though it felt glacially slow at the time, things have changed – in a good way – and cost-effective low energy technologies have fortuitously appeared right when we need them.

ON THE DRAWING BOARD:

A creative adventure with an old film set

WORDS Agnes Nienhaus and Michael Shrapnel

Most people would probably not consider a collection of old Nissen huts and shipping containers – once a set for a TV mini-series – the ideal starting point for a self-sufficient, sustainable dream home, but Grant and Charlotte are not most people. Michael Shrapnel and Agnes Nienhaus of Beachouse explain how a serendipitous creative alignment with their clients led to a quirky, playful design for the buildings' metamorphosis.

In 2013, Melbourne couple Charlotte and Grant purchased a property in the rolling foothills of the Strathbogie Ranges in rural Victoria. It included an array of shipping containers and two arch-roofed Nissen huts – one partially renovated, the other in original condition and both somewhat battered by the strong prevailing winds. The couple are creative and inventive by nature and immediately saw the potential of the property and the existing buildings to become their forever home – an off-grid, self-sustaining sanctuary to live, grow, work and raise their two young children.

Looking for a designer to help them transform the buildings, Grant and Charlotte first made contact with us in late 2018, having seen our River House in *Sanctuary 40* and enjoying the playfulness they saw in the design. We were very busy

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The collection of shipping containers and Nissen huts on Grant and Charlotte's property is on a rise with beautiful views of the Strathbogie ranges.

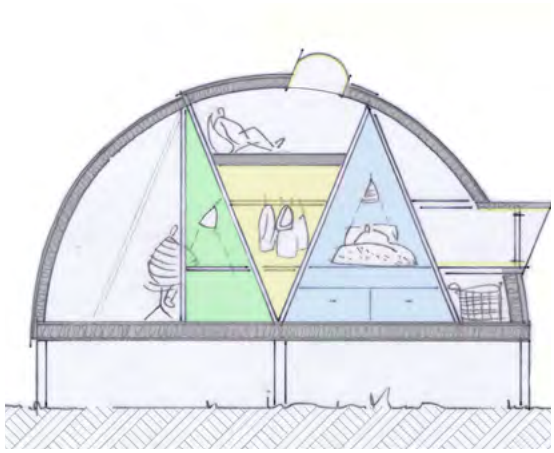
the scrapbooks and referenced these and other images in our concept designs, including playful spaces, shapes and forms, the use of colour, cosy intimate areas and lots of greenery both inside and outside.

We were delighted when Charlotte and Grant informed us that they intended to make a quick winter trip to Tasmania to further discuss and refine the design. Our round table meetings during their stay generally included the kids, with lots of eating, drinking, drawing and talking. This time together confirmed for us their engagement with the project and deepened our collaborative relationship.

Between them, Charlotte and Grant have a wide range of knowledge and skills that they will bring to the task of owner-building their home. Grant is a landscaper with qualifications in ecology and environmental management and has worked in farming and as a general engineer. Charlotte has a background in fine arts and education and has studied permaculture design and horticulture. Both are passionate about regenerative farming and edible plants. They have received a biodiversity grant to revegetate 20 hectares of the property, and intend to turn much of the remainder over to producing their own food. All waste will be composted or recycled and the house will be off-grid, powered by a number of different strategies including solar and wind power. Rainwater will be harvested to supply the house and garden.

Charlotte and Grant are currently repairing Hut 2 to serve as a temporary dwelling while they work on the renovation of Hut 1 which will become their main house. They were also keen to

SECTION THROUGH KIDS ROOM AND LOFT



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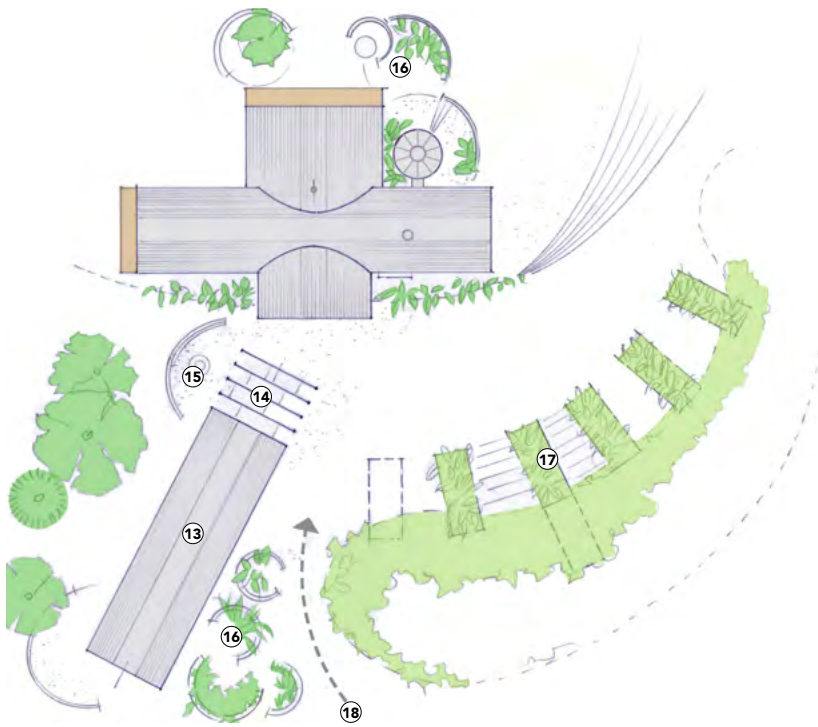
The concept design involved retaining the curved structure of the Nissen huts and creating smaller spaces inside using joinery elements. Sleeping areas for the children are defined by moveable joinery pieces, like magic boxes in an adventure playground.

SITE PLAN



Home-grown flavours

Designing a native food kitchen garden

WORDS Julie Weatherhead

Looking to take your backyard vegetable garden up a notch? A native food kitchen garden can provide delicious ingredients for your cooking as well as support local biodiversity, and with the right planning they are surprisingly easy to create. Ecologist and educator Julie Weatherhead of Peppermint Ridge Farm in Victoria explains how it's done.

Australian native plants – over 6,000 different species – have been used by Aboriginal people for food and medicine for thousands of years. We all benefit from this knowledge and owe a debt of gratitude, as many of these plants have been shown to contain powerful medicinal qualities.

We have found that most visitors to our farm cannot name more than a few edible native plants, which is unfortunate as these plants are like an 'Australian cornucopia' – an abundance of food from plants that have evolved to match Australian environmental conditions. These plants thrive in our gardens, provide important habitat, are attractive garden specimens, are packed with nutrients and taste great.

However, interest is growing in these unique plants. Native foods are being championed by many chefs in our high-end dining sector and many schools are planting their own native food kitchen gardens as an educational and culinary tool. The good news is that cultivating native food plants at your place is not difficult, as these plants fit perfectly into kitchen gardens and can be added to existing ornamental spaces.

↖↑
Small-leaved tamarind and river mint

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