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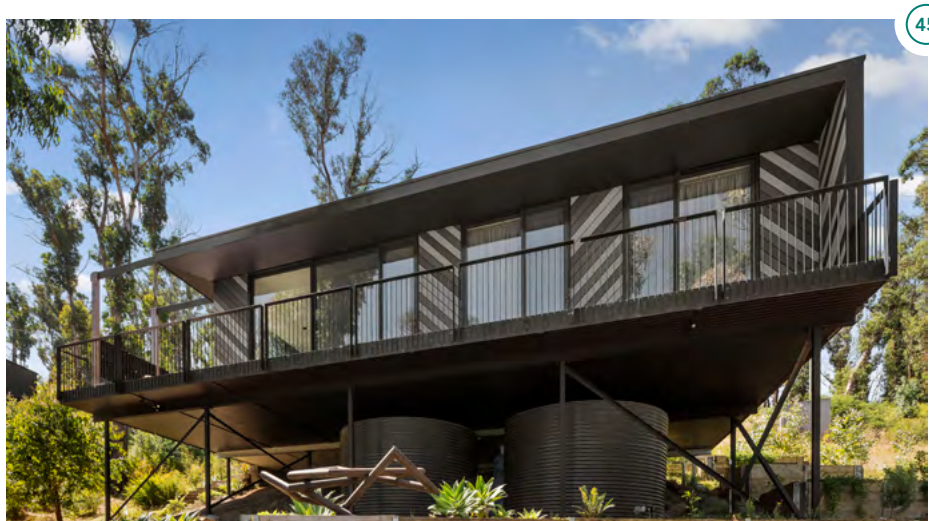
HOUSE PROFILES

MODULAR AND PREFAB SPECIAL



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An old jacaranda tree – the only non-native presence in the yard – is a striking focal point.

Photosynthesis house

A tiny beach cottage in Sydney's Manly Vale is sensitively renovated to bring all-day sunlight and year-round comfort to a family of five.

WORDS Fiona Negrin
PHOTOGRAPHY Simon Whitbread

PERVASIVE MILDEW, A SCANT 90M² OF floor space and just two bedrooms weren't providing the best environment for Ruth and Keith to raise their three young boys. On the other hand, the couple loved their modest 1950s beach shack in Manly Vale, Sydney; it had a 'nice feel' and loads of natural light. When their architect Matt Elkan shared their reservations about demolishing it to rebuild from scratch, the decision was made to renovate and extend.

The compact cottage, although dilapidated, had a humble character that they wanted to preserve. They kept its frame but stripped away the fibro cladding and interior walls to leave just "a skeleton of the old home on its foundations". The new external cladding is 8.5mm fibro with painted batten joints to provide a more robust, "slightly more thought-through" riff on the original version. The foundation, as it happened, was a sandstone rock shelf. Rather than excavate it, the couple have allowed the rock to govern the levels of their extension and to become a feature in its own right.

The new house takes advantage of excellent orientation with full-length, low-e glass windows along the north face. In the central area of the house, where the old part joins the new, light pours in through an expansive skylight strip made of high-spec, double-glazed, low-e glass. It's Ruth's favourite space: "I find myself spending hours in the central zone of the house when I have the chance. With the louvres and the big skylight, it's a good feel." In fact, the house's incredible solar access has led the couple to dub it the Photosynthesis House.

While the light is welcome, the heat that accompanies it is not. The area's sandstone rock shelf acts as a heat sink and with minimal vegetation to offset it, summers in Manly Vale can be stifling. To shade the house and open it to cooling sea breezes there are "vast areas of louvres – we probably kept the louvre industry in business," jokes Matt. External sensor-operated, smart Venetian blinds shade the northern and western sides of the house, and Keith and Ruth have already noticed the comfort these bring on hot days.

Locally sourced timber features inside and out, and this consistent material palette does an excellent job of integrating the old part of the house with the new. Hardwoods are used extensively, including on windows, with tallowwood on the decking because "it doesn't splinter or warp," says Matt. Internal floors are all blackbutt and there's extensive use of imported melamine board, made by TZ Austria. "It has VOC emissions one-fifth of what would classify as e0 in Australia; the standards in Europe are more stringent," says Matt.

He says the joinery was blackbutt veneer because of the more varied texture and lower waste. Matt credits Fine Earth Joinery and builder Greg Lofhjelm for their attention to detail on the custom build. "A

Small footprint, smart ideas

A renovated worker's cottage in Melbourne's inner west marries age-old passive solar principles with bleeding-edge technology.

WORDS Fiona Negrin
PHOTOGRAPHY Nikole Ramsay

LEANNE AND SCOTT'S PAINSTAKING renovation of a 100-year-old, lean-to cottage in Melbourne's Yarraville held enough painful lessons to defeat a less resilient couple. Instead, it converted these two from sustainability stalwarts to environmentally sustainable development evangelists. At Sustainable House Day 2017 the couple was humbled by the level of interest in their small home and have responded by opening the house to the public on scheduled dates to offer "some great ideas, useful contacts and the confidence to get going on your own sustainability project".

At their first open house event in January this year, Leanne and Scott shared their philosophy of 'abundant sustainability'. They aspire to make sustainable design so irresistible ("it's not always about giving up something") that the unconverted are inspired to adopt its principles. "If we can't get the masses on board, we can't solve the climate crisis," notes Scott, who says they want "to do for houses what the Tesla Model S does for vehicles."

The couple spent a year laboriously partially demolishing the small house by themselves and "uncovering its history", says Leanne, who salvaged and hand-cleaned 800 Melbourne red brick pavers from the courtyard as part of this endeavour. With the help of local building designer James Goodlet at Altereco, they mindfully designed the renovation to "be here in another 100 years, for whoever comes after us."

At a mere 100m^2, the footprint is "nothing ambitious in scale," says James, "but Scott and Leanne were happy to work with the space they had. It's rare to get clients with that much passion about being sustainable."

The house's passive solar properties are impressive by any yardstick, but what makes it more Tesla S than GM EV1 is the couple's meticulous attention to detail.

Their green roof was universally admired at January's open house. Planted above the kitchen/living area with water-wise native plants, it creates outdoor space on the tight site and offers surprising glimpses of greenery through highlight windows. It also insulates the kitchen

The compact but appealing living space sits at the back of the house, with large sliding glazed doors to the north. For the kitchen, Leanne and Scott chose benchtops made from 75 per cent recycled glass, mirror, porcelain and earthenware.

Each module is constructed from SIPs using expanded polystyrene foam between two sheets of Colorbond. Colorbond Diversaclad is used as cladding, which contrasts beautifully with the original brick cottage.

BUILDING TYPE:
Modular construction, steel frame

PROJECT LOCATION:
Brunswick, Victoria

SIZE:
113 m2

MATERIALS:
SIPs (structural insulated panels) used for floor, wall and ceiling components, steel frame, black powder-coated double-glazed windows

COST PER SQUARE METRE:
$2700 to $3200, includes full architectural design services and manufacture

BUILDING ENERGY STAR RATING:
7 Star (min)

TIME TO LOCKUP:
1 to 2 weeks on-site works post-installation

PHOTOGRAPHY:
Jack Lovel and John Madden

Modscape

Since it was established over a decade ago, Modscape has seen its business shift from servicing remote and holiday locations with prefabricated modular homes, to delivering the majority of its projects to inner city sites. In fact, these latter can have more complex site access issues than remote areas, such as parking restrictions and prolonged and expensive traffic control, which prefabrication can ameliorate.

"We installed 20 modules (10 apartments) atop the eighth floor of a hotel in St Kilda and they didn't lose one day of operation," says Modscape managing director Jan Gyrn. The crane work required the closure of a major tramway for less than 24 hours. "It's a good example of when modular comes into its own; it provided a 15 per cent cost saving but also avoided 12 months of having personnel coming and going."

Modscape has grown to over 40 staff in its Brooklyn studio in Victoria and has residential as well as commercial clients. "Modular solutions are now a legitimate alternative approach," says Jan. "We find time and cost certainty are the main attractors for our clients, as well as the aesthetics and materials we offer." Modscape can provide structural modules only, through to a "one stop shop" that includes full internal fit-out, landscaping, solar + battery systems and waste water treatment, among other services.

It has always used sustainable materials and now takes a 'closed loop' approach that has seen it move to using recyclable steel frames for 90 per cent of its projects. Jan says steel has other benefits too: it allows modules to be stacked up to six storeys, reduces the number of footings and provides design flexibility as "modules should not affect the architecture."

On Christmas Day 2015, 98 houses in the coastal hamlet of Wye River were destroyed in a bushfire, including the original Arkit-built house on this site: "It was built just a year earlier and it was quite devastating," says Craig Chatman. "After some contemplation, the clients decided to rebuild exactly the same house on the same footprint and using the same design (and BAL rating). So while sad, it was also very affirming."

Arkit

Arkit designs and uses modular and panelised construction. The approach used is determined by which will achieve the best outcome, based on the site. For instance, the Wye River project (pictured) used prefabricated panels so it could be delivered flat-packed; for this site, modules would have been a challenge to transport along the winding, single-lane Great Ocean Road. The site topography also made the use of cranes a challenge. "We have found approximately 70 per cent of our projects are still modular," says architect and Arkit founder Craig Chatman. "But with the panelised approach we are not constrained with what can be transported. Sometimes height and volume is important and if a client needs 4m or 5m ceilings, with panels, we can do that."

The company uses similar materials regardless of the approach taken; timber frames, well-sealed double-glazed windows, Passivhaus certified ProClima building wrap, formaldehyde-free OSB and high-density insulation are features of each system. As much of the build as possible is prefabricated within the factory environment, with internal wall linings, footings and services connected on site.

Chatman established Arkit in 2010 as an architecture-driven prefabrication business. Based in Sunshine, Victoria, the studio has grown steadily to complete up to 20 projects each year and employs 30 staff, including seven architects and 15 carpenters. While the majority of projects are in Melbourne and greater Victoria, Arkit is beginning to work outside the state. "We are attracting clients highly educated about prefab," says Chatman, who is currently involved in a project to the Passivhaus standard in Richmond, and several in New South Wales.

Habitech has developed a network of building partners to deliver projects in Australia and New Zealand.

Habitech Systems

Habitech Systems has developed its own sustainable building components based on an integrated wall and roof panel system. Founded in 2008 by architect Chris Barnett, the company offers full architectural design services, with a strong focus on thermal performance and healthy interiors. Using its own SIPs (structural insulated panels) which include an integrated cladding system, Habitech uses a growing network of local builders to deliver its projects.

"We work hard to continually improve our system and keep benchmarking it," says Chris. Monitoring of completed Habitech houses shows they are outperforming the calculted energy star ratings, and some produce more energy than they use from their 6kW solar systems. "We can guarantee thermal performance, and can also produce accurate labour and material costs so our projects don't blow out." Habitech uses flat-pack delivery, and its services include heat recovery ventilation and solar + battery systems, if required.

The Melbourne-based company has delivered 35 houses to date, and is scheduled to construct another 30 in 2018 as the company scales up its design and manufacturing capabilities. The science behind the building system aligns with the Passivhaus standard, and Habitech also works collaboratively with other architects.

The majority of Habitech's clients are in Australia's southern states, but it has also partnered with builders in New Zealand to distribute its product and services there. "In Christchurch there are earthquake construction challenges," says Chris. "The strength and bracing of our SIPs based system responds well to the design requirements there."

BUILDING TYPE:
Panelised construction system, deconstructable

PROJECT NAME:
Warrander Studio

PROJECT LOCATION:
Governors Bay, New Zealand

SIZE:
65 m²

MATERIALS:
Structural cross laminated timber (CLT) panels, cladding 'cassettes' containing insulation, building wrap and cavity, exterior fibre cement sheet cladding, Douglas Fir rain screen

COST PER SQUARE METRE:
NZ$3400 (AU$3100) including foundations and fit-out (at 2014 prices)

BUILDING ENERGY STAR RATING:
Unavailable

TIME TO LOCKUP:
2 weeks on site

PHOTOGRAPHY:
Andrew Cameron & Makers of Architecture

Makers of Architecture

Wellington-based Makers of Architecture and construction company Makers Fabrication work together and collaboratively with other designers, using digital technology and CNC (computer numerical control) capabilities to create custom designs efficiently. "Design is our focus," explains director Beth Cameron. "We work closely with the build teams in an iterative design-build process." The company also has sustainable design considerations front and centre. "Our homes are designed specifically to respond to site and the local environment, with natural ventilation and passive solar gain allowing them to perform with minimal assisted systems."

The company also considers the future life of the building, designing with future flexibility in response to the changing needs of the occupants: their design system allows components to be unclipped, disassembled, altered, added to, moved, reconstructed or recycled if needed.

While Makers can work with a variety of construction systems, the Warrander Studio is a great example of the 'CLT with cladding cassette' system developed specifically to make the most of their design and fabrication technology. CNC-cut cross laminated timber (CLT) panels provide the structure and interior lining; prefabricated plywood cassettes containing insulation, service runs and external fibre cement sheet cladding are fitted to the exterior CLT panels using pre-routed slots. A timber 'rain screen' connects to the exterior of the cladding cassettes, providing the final skin.

The system worked well for this tiny two-storey home on a tricky site overlooking Governor's Bay near Christchurch. "It allowed for a custom site and client specific design, and came together rapidly on site," says Beth.

Under construction: The author's passive solar house in Blampied, Victoria, is constructed with light-earth. All images: Mara Ripani.

Paving the way to owner-building

The pathway to owner-building has been a smooth one for Mara Ripani and her family, but there were some missteps made along the way that could have been avoided had they known what they do now.

OVER 13 YEARS AGO, MY PARTNER RALF AND I EMBARKED on our first owner-builder project, a renovation. We had purchased a small, double-brick house in Melbourne, north facing, and with space for chickens and growing food. Over several years we achieved our goal of maximising its comfort by increasing its passive solar performance. We then moved out of town and began a second, more ambitious project – a new light-earth house on six hectares (15 acres) in Blampied, Victoria.

For both projects we set out to build ourselves. For Ralf, this offered a mental break from his office job and all the social dynamics that come with it. For me it's an opportunity to work closely with someone I love, and a chance to fine-tune the ideas I've gleaned over 20 years of sustainability education.

We've found building together has been a positive experience, with mistakes made of course, but generally insignificant enough to cause little heartache. However, there was one mistake that could have cost us dearly. In this article I share the nine key things I needed to learn, and if you are starting out as an owner-builder, you will need to know these too – and so much more!

BEFORE YOU START: PLANNING/DEVELOPMENT APPLICATION

Be meticulous about your planning permit or development application. One of the most important steps to take, especially for those purchasing vacant land in regional areas, is to engage an excellent conveyancer. However, don't rely solely on their work; make sure yourself that the information included in the legal documents is accurate. If the sale of land comes with an existing planning permit, confirm the conditions of that permit by visiting your local government. Meet with a planning officer to identify conditions that may restrict your future build and ask them about overlays: heritage, environmental, bushfire, et cetera. Most local governments have development applications online with all conditions and validity dates.

We didn't do this, and experienced a terrible situation when we purchased our current property: the Section 32 (the relevant document in Victoria) was incomplete and did not include the conditions attached to the planning permit. Instead of being able to renew the permit two years later, we were told that we could no longer build; the value of our property plummeted. We consulted a lawyer, but it was through the help of a private planner that we managed to have the error identified and our permission to build reinstated. It was a very intense time for us.

RESPONSIBILITIES OF AN OWNER-BUILDER

The first part of an owner-builder's journey is to know your responsibilities: you must own the land on which you are building, and take full responsibility for all the residential building work. The level of involvement, though, is up to you. You can choose to project manage and engage trades and a registered builder, or project manage and do the building work yourself (using qualified

trades when required). If you plan to engage a builder to do all the building work and project manage the entire project, then you are not an owner-builder, and you should not enter into a building permit stating that you are.

REGISTER WITH THE RELEVANT AUTHORITY

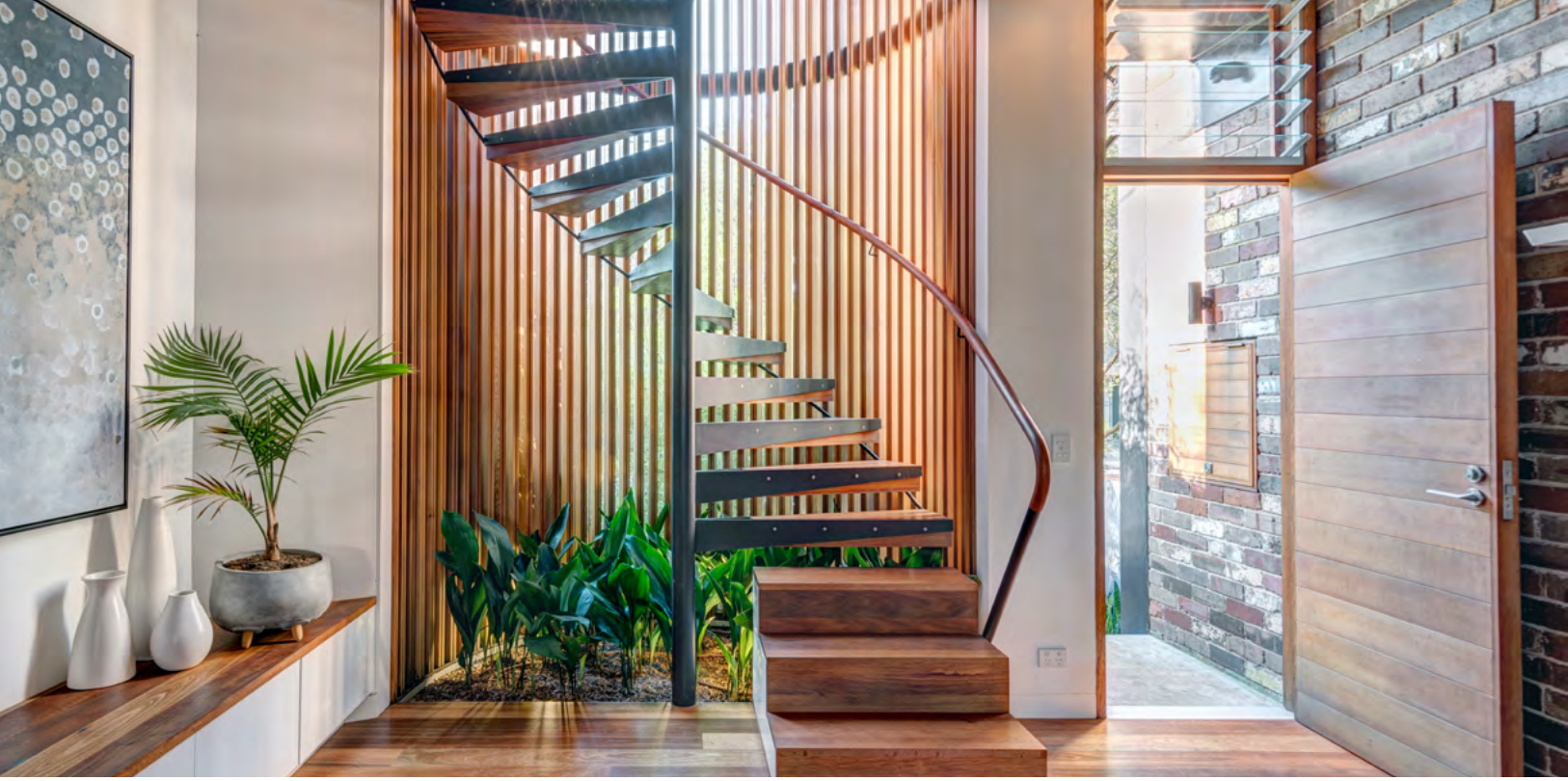
You will need to find out if you require a 'certificate of consent' by registering your intention to owner-build with the relevant authority in your state or territory, and pay the associated fee. [In most states, owner-builder permits are required for projects over a certain dollar value, and this minimum differs everywhere.] Gaining consent will involve undergoing training and you may need to complete a course or obtain a current construction induction card or 'white card'. Don't be lured into doing online training in another state, as it will most likely not be recognised by the state you are in.

Be patient during this period. As you wait, engage an engineer, start thinking about your water and energy systems and landscaping, and organise soil tests for your property as these will also inform the building process.

DRAWINGS: ARCHITECT, DESIGNER OR DRAFTSPERSON?

Drawings will need to comply with building regulations, and most people will choose to work with a building designer or draftsperson to produce these. The builder we chose was also an experienced designer with an understanding of permaculture living, which was perfect for us, and all the drawings were done by him. But we made sure to keep the design simple to reduce costs and ensure we had the ability to build it! If you are a highly skilled and experienced builder looking for an innovative design, then working with an architect will give you room to workshop a range of design visions; the right architect may be willing to mentor you along the way. It's worth noting that some architects won't take on small projects; you may find it easier to identify someone who does by listing your project online with a trade directory, such as 'hipages'.

As an owner-builder be on-site as much as possible: "Be there for the pouring of the slab and when the plumber and electrician are due. Often details in plans aren't read and you need to be there to communicate exactly what you want."



Stairs with flair

The humble staircase can do far more than provide access to your second floor. Anna Cumming shows that with a bit of creativity, stairs can fulfil multiple purposes from storage and thermal regulation to design feature or just sheer fun.

AS OUR CITIES GROW AND THE NEED FOR CLEVER URBAN densification grows with it, more and more new homes and extensions are going up to increase living space while preserving precious outdoor area. And to get upstairs, you need – well – stairs. It's easy to think of a set of stairs as nothing but a space-hungry necessity, but with some thought they can be so much more, as architect Shae Parker McCashen of Green Sheep Collective counsels: "The need for stairs provides an opportunity for an exciting design feature. Any built element should offer more benefits than its traditional singular function – stairs can provide a beautiful aesthetic and offer many functions beyond travel between levels."

STYLE

Architect Steffen Welsch also loves stairs. "They allow you to explore a space. They can be a feature – we often involve artists in our stair designs – but they can also be hidden or in an unexpected location and add an element of surprise." Depending on the space available and the look you're after, stairs can be straight, curved or spiral; cantilevered, suspended or supported from underneath; open or closed-tread; tucked away behind a door or a sculptural statement.

Space-saving styles include spiral stairs, ladders, moveable stairs and alternate-step stairs which save on horizontal space by

This dramatic staircase is part of a Copenhagen apartment renovation by Danish architects JAC Studios. The lightweight steel upper section is suspended from the first floor level to give the impression of levitation; the lower section is a series of stacked concrete plateaux, some of which extend to form seating and a hearth for the fireplace. Note that tighter regulations would require a balustrade if this stair was replicated in Australia.
Image: Karina Tengberg.

Sydney architect Terry Bail knows how to create a 'wow' factor with his designs. This incredible stairwell with slippery dip in his 'Gibbes Street' project was built by Create Constructions in conjunction with the immensely talented joiner Oscar Priekaerts. Image: Jon Bader