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Sanctuary

INSIDE ISSUE 24 115+ green products & design tips; Sustainable House Day 2013 special; Top tips for an eco home; Home sustainability assessments; Blinds & shading

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[1] To qualify for the goGreen Home Loan the home financed must have an energy rating of 7 stars or more under the Nationwide House Energy Rating scheme.

[2] **bankmecu** offsets an equivalent amount of land as is being constructed on into the bankmecu Conservation Landbank in accordance with the land management plan developed and implemented by Landcare Australia and overseen by Trust for Nature. Carbon sequestered from these trees is monitored and reported by Landcare CarbonSMART. Homes constructed on large lots of land such as hobby farms will be offset according to the amount of land occupied by the dwelling.

[3] Loans must be established for a full 12 months and a maximum loan to value ratio of 90% (Family-Pause) or 80% (Eco-Pause) applies. Pausing repayments will result in interest continuing to accrue on the loan, potentially increasing the terms of your loan. Full conditions available from **bankmecu**.

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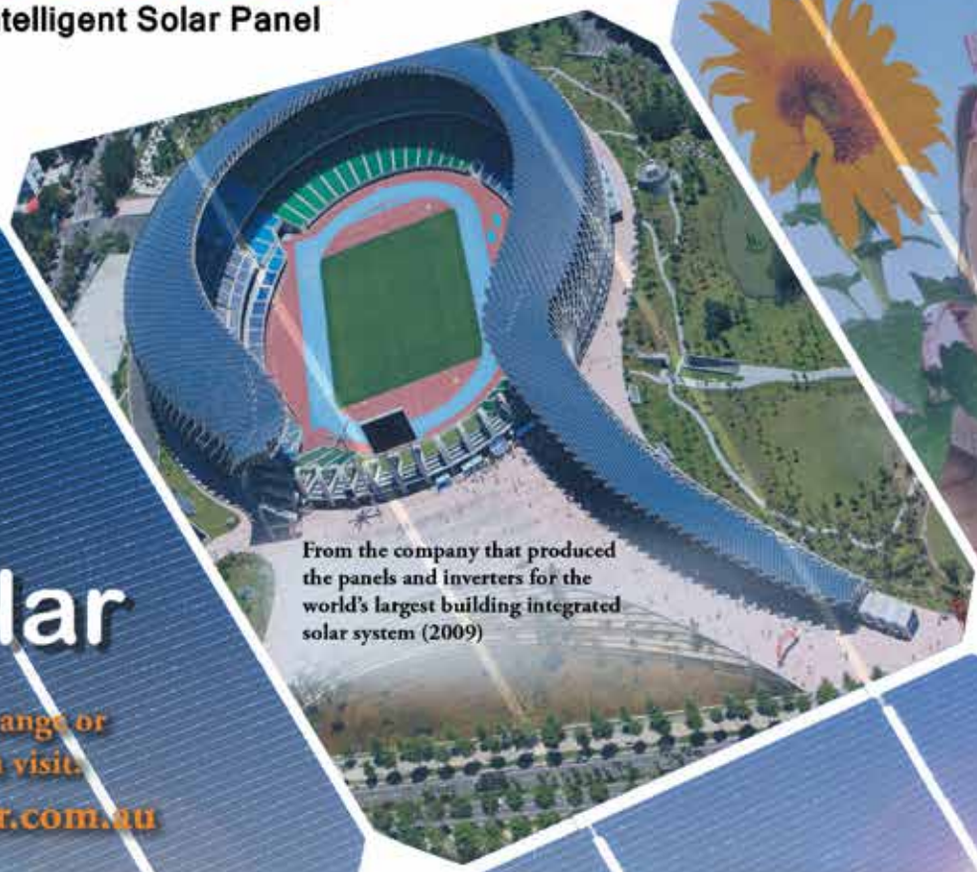

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MODERN GREEN HOMES
Sanctuary

Contents

—Issue 24

SUSTAINABLE HOUSE DAY SPECIAL

Doors will open to curious crowds for Sustainable House Day this September. This Special features houses from around the country that will open this year or have opened in the past. Inside, you'll also find tips on the basics of sustainable design.

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granddesignslive.com.au

*At time of printing Kevin McCloud confirmed for all Melbourne show dates and Sydney Sunday show. Refer to website for specific ticketing details, VIP packages and celebrity appearances.

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SOLAR HOT WATER

Letter from the editor

—Issue 24

As spring tiptoes through doors and tempts our gardens into bloom, this issue of *Sanctuary* features inspiring homes that raise design standards and promote more environmentally responsible lifestyles.

Homes that achieve 7 to 10 Stars are more achievable and affordable than ever. And experts agree, designing and building energy efficient homes is about good design that applies the principles of passive solar design, not necessarily more specialised or expensive materials. To recap the basics of very comfy homes, we cover these principles and a few other sustainable design tips on page 40.

Focusing on high-achievers, this issue features several 7-plus Star homes designed to be beautiful and affordable for the many rather than the few. Verity Campbell explores how many stars we should aim for when we build sustainable homes (p54). We also feature a challenging project in Borneo by Australian architects Marra + Yeh (p60) and we include a list of the sustainable design and living professionals involved in Speed Date a Sustainable Expert Adelaide (p75).

As well as leafing through the pages of *Sanctuary* for ideas, advice and inspiration, we encourage you to visit as many sustainable homes in your area as you can on Sustainable House Day this September. Our Sustainable House Day special profiles the homes, insights and advice of the homeowners who have opened their homes in previous years (p37).

In July, we launched our new-look website and online Sustainable Design & Living Directory. You'll find news and events, advice from our friendly experts, interviews and profiles of the amazing homes we've featured in the magazine. The directory lists sustainability experts and home design and building professionals. If you haven't already, check out the new website and directory at www.sanctuarymagazine.org.au

For now, enjoy the articles in this issue, including our outdoor features on water-wise gardening (p82) and the garden that's part of Australia's first entry into the international Solar Decathlon student design competition (p79).

Sarah Robertson, Editor
sanctuary@ata.org.au

Sanctuary is published by the Alternative Technology Association (ATA), a not-for-profit environmental organisation promoting renewable energy, sustainable building and water conservation since 1980. ATA's advisory service, policy team and publications aid 5500 members Australia-wide.
www.ata.org.au
www.sanctuarymagazine.org.au

Congratulations to Jason Allen of South Australia, the lucky winner of a complete solar power system from Delta Energy as part of ATA and *Sanctuary* magazine's recent subscriber prize. For info on our current solar hot water system subscriber prize, see page 6.

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Reviews

—Books, apps, websites and other interesting stuff

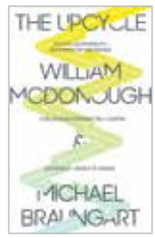
If you have recommendations for books, smart phone apps, blogs, websites or anything else you think would be of interest we'd love to hear from you. Email us at sanctuary@ata.org.au

BOOKS

100 CONTEMPORARY GREEN BUILDINGS

Philip Jodidio
TASCHEN, 2013
$85.00

Discover creative and imaginative architecture in this double-volume book featuring some of the world's most lovely sustainable buildings. This is not a technical book but one that inspires with images, architect biographies and building descriptions.



THE UPCYCLE: BEYOND SUSTAINABILITY—DESIGNING FOR ABUNDANCE

William McDonough & Michael Braungart
North Point Press, April 2013
$35.95

Following their 2002 book, *Cradle to Cradle*, authors William McDonough and Michael Braungart find an approach to product and building design that not only uses resources sustainably but can ultimately benefit the planet.

APP

SOILMAPP FROM CSIRO

iPad; free

Using your location, SoilMapp taps into Australia's national soil database to show what types of soil are near you. You can also explore soil by different types or locations around the country. The app is designed for farmers, researchers and natural resource managers, but certainly caters to anyone who loves soil.

WEBSITES

SMART BLOCKS

smartblocks.com.au

Smart Blocks provides information and how-tos on reducing the energy use of shared facilities in an apartment block. A handy tool to help landlords and apartment dwellers who are looking to use less electricity.

URGENT ARCHITECTURE

Bridgette Meinhold
W.W. Norton & Company, Inc., 2013
$59.95

Appropriate buildings are needed to withstand future changes in climate and to provide urgent temporary and permanent housing in the case of natural disasters. In this thought-provoking book Bridgette Meinhold provides examples of homes that are quick to build, inexpensive, eco-friendly and tough.

ZERO WASTE HOME: THE ULTIMATE GUIDE TO SIMPLIFYING YOUR LIFE

Bea Johnson
Penguin Books Australia, July 2013
$26.00

Find out how reducing your waste can benefit your health, wealth and the environment. This book is full of hints and tips from an author who has created a waste-free home.

GROW IT LOCAL

www.growitlocal.com.au

The Grow it Local website gives users the opportunity to register their own veggie patch, share produce and gardening tips, and receive updates on upcoming events. Supported by the City of Sydney, its aim is to promote good food, sustainability and community.

BUILD BITS

www.buildbits.com.au

This website acts as classified pages for leftover building materials. You can find tiles, timber, plumbing fixtures, industrial vacuum cleaners and any other building materials people might have to sell.

DID YOU KNOW?

A 10 Star energy-rated homes should need no mechanical heating or cooling.

Home energy ratings aren't everything – behaviour and resource-use are also important.

Up to 90 per cent of direct sun and heat can be blocked by simple shading.

There is approximately 1,000GJ of embodied energy in the average home. This is roughly the same energy as a household will use over 15 years.

Well-designed shading lets the sun's warmth into your house in winter and keeps it out in summer.

Sources: *Your Home*, 'Blinds: Get your sun shades on' p71, 'Designing 10 Star homes' p54. Image courtesy Ally Taylor, 24H Architecture, Panyaden School, Chiang Mai, Thailand from *100 Contemporary Green Buildings*.

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.

NEW BUILD INFORMED BY *SANCTUARY*

Thanks to *Sanctuary*, (which I have kept up with from its conception) we have been able to incorporate many sustainable design aspects into our new home that have allowed us to build a very sustainable home for our 'next stage' of life.

Our site is very exposed and we are in a cold climate, so we have piped underfloor heating, heated by solar evacuated tubes. The summer heat from the evacuated tubes will be stored underground and used during the winter as backup on cold inclement days. The house will have double-glazed windows and doors and be well-insulated.

Thanks to Craig Pattinson in Port Macquarie, our draftsman Andrew Blake and our builder Matthew Black, we have an amazing building happening before our eyes. – *Penelope*

RETHINKING HOME DESIGN

We just moved into our new house on the outskirts of Wodonga, Victoria, that is totally inspired by advice from *Sanctuary*.

It's not an expensive or grand build but we've used reclaimed bricks (some for internal thermal mass walls), some white Colorbond for west-facing walls, lots of insulation, double-glazed windows, and benchtops and doors all made by me with locally harvested ash.

It's amazing how well the solar passive design is working when we have a few hours of sun! Thanks for the new way I now think about house design. – *Tim*

From our Facebook friends

www.facebook.com/SanctuaryMagazine

ROOM SIZES ON PLANS PLEASE

I'm the sort of person who goes to the floor plan first and then reads the article and looks at the photos afterward. However, I'd get a much better idea of the plans you put in the magazine if you could put a legend on them so we can get an idea of room sizes, external wall sizes, etc. – Jude

DEVELOPMENT AT CAPE PATERSON

A reader wrote to us about our article on eco developments in *Sanctuary 22*. We've included his letter and a response from Cape Paterson below.

Against development

Sanctuary's article about the Cape Paterson and other similar eco developments, and the prominent placement of its advertisements in your latest issues, fails to consider the proverbial 'other side' of the coin – namely, the primacy of protecting and rehabilitating fragile ecosystems *over and above* the mantra of 'sustainable' building and 'ecological' living practices.

While the concept of eco developments as a more sustainable form of communal built environment should be welcomed and fostered, their planning and development should also be judged in terms of their consistency with a 'tread lightly' environmental philosophy. This should take into consideration the developments' relationship with, and impact on, its surroundings, in adherence to the relevant planning policies that apply to sensitive land areas, and it should consider the local community opinions. The opposite has been the case with Cape Paterson.

The chosen site of the Ecovillage is the result of a prolonged process. The local community feels their wishes to preserve the land adjoining the Bunurong State Coastal Park's heathland for the enjoyment of generations to come have been trampled over.

I wish that *Sanctuary* would offer readers a less unbalanced and superficial opinion about such 'eco' developments in the future, and give proper and full consideration to the often multifaceted issues that impinge on where, not just how, we build and live, sustainably.
– *Giancarlo*

In response

The Cape Paterson Ecovillage team comprehensively considered all sides of the coin in selecting an appropriate site for the project.

A primary driver of the project has been and remains protecting and restoring the local coastal ecology. The site was selected because it is 40 hectares of degraded and cleared grazing land, which allows us to avoid building over significant habitat areas, and to restore significant ecological capital to the site and coast. We kickstarted this process six years ago by removing 60 head of cattle and ceasing the annual application of superphosphate. The next phase involves seed collection, propagation and replanting of several hundred thousand locally indigenous coastal plants to restore and connect large areas of new habitat on our site to the adjoining coastal park.

Our first residents have voted with their feet, with swamp wallabies, kangaroos and echidnas recolonising the site since we removed cattle. Net gain calculations performed by independent botanists show the project when completed will add significant ecological net gain to the site and coastal reserve. The permanent exclusion of cats and dogs will further encourage wildlife to take up residence in future.

In granting the project a permit to proceed, state authorities determined the Ecovillage to be consistent with coastal policy. At the five public meetings we held for all Cape Paterson residents at the Cape Paterson town hall over a 10-year approvals process we noted enormous support for the project. We encourage anyone who is interested in finding out more about the development's ecological restoration efforts, sustainable architecture, clean energy or water conservation to visit the site information centre on a weekend.
– *Brendan Condon, Director, Cape Paterson Ecovillage*

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Earthly home comforts

An earth-covered sustainable home pays homage to its surrounding environment.

WORDS Sasha Shtargot
PHOTOGRAPHY Ben Wrigley

ON WET AND WINTRY DAYS IN VICTORIA'S YARRA RANGES, a house has to be decidedly warm. But it's the quality of warmth in Tyrone Jasper and Hailey Cavill's house that's arresting – deep, yet gentle and soothing.

"The humidity doesn't change, it doesn't dry you out. It's the most human heat," says Tyrone.

The heat rises from the tiled floor thanks to a gas-powered hydronic slab heating system, and on this chilly day wood is also burning in the Cheminees Philippe fireplace. An enormous steel fan on the curved ceiling circulates air through the double height void in the living area.

The heating is just one of the striking things about this house in Warburton, east of Melbourne. From the outside there is the home's distinctive curved shape, which pays homage to the contours of the surrounding hills. There's an impressive earth-covered roof and a large pond at the back that continues the strong connection between home and environment.

Tyrone, a builder and craftsman, and his partner Hailey moved into the house, designed by Alvyn Williams of Soft Loud House Architects, in August 2012, after 18 months of construction. On a 1.4-hectare property overlooking the ranges, the home would provide country respite for Hailey – a social entrepreneur with a busy working life – allowing her to work from a home office with graceful, idyllic views. It would also provide a challenging project for Tyrone as an owner-builder and project manager committed to sustainable design.

Walking into the 7.3 energy star-rated house, an entryway opens into a large central living and kitchen area. North-facing double-glazed windows and doors bring plenty of light and open to a fully glazed sunroom designed for passive heating. Beyond the sunroom is the

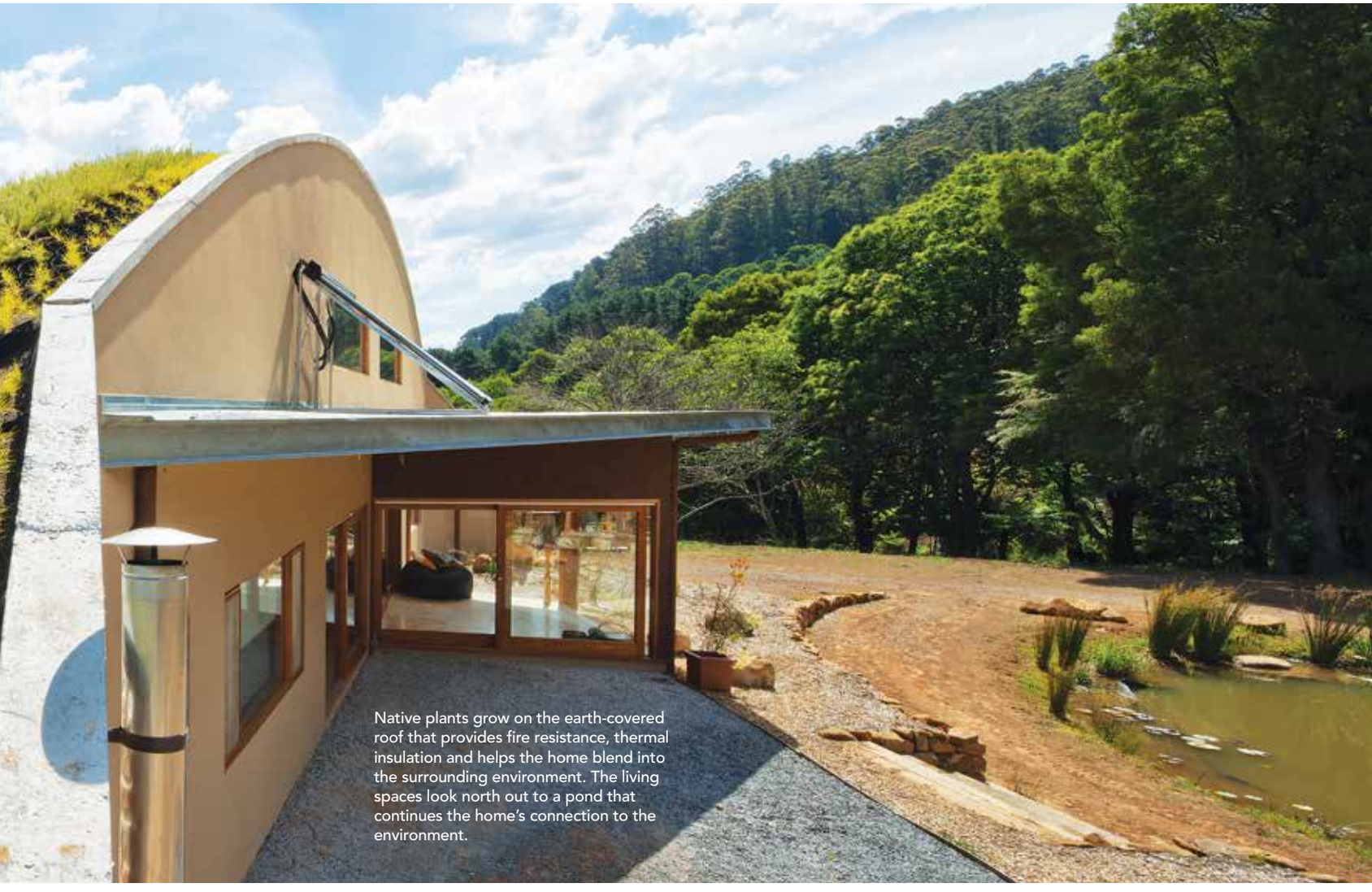
kidney-shaped pond, on the site of a disused concrete reservoir that once supplied water to Warburton – the couple employed a local contractor for the major job of breaking up the concrete. They then reused the concrete on their new driveway.

The living area is an opportunity to see Tyrone's ingenuity and skill as a craftsman: the concrete kitchen benchtop is his creation and the stone for the fireplace was cut by hand with the help of his 80-year-old father, William. A prominent bookshelf was made from locally milled blackwood.

At one end, the rectangular living-kitchen area opens to the main bedroom and ensuite bathroom. Here the roof has been designed to be open to allow a majestic view of the rising moon from the window above the bath. At the other end of the house is Hailey's office space, with two work rooms and a large storage area. A stairway from the living area leads to a landing with a laundry and toilet and then to a mezzanine level, where a bedroom and TV room have been designed for guests.

There's much about the 215 square metre home that is atypical, even novel. Concrete-filled polystyrene blocks were chosen as the home's main structure – the fully constructed polystyrene was up in a few days, with the concrete poured into the walls on-site. "It was incredibly fast to put up and it's great insulation," Tyrone says. As a waste product from the petroleum industry, Tyrone believes polystyrene has environmental credentials.

The green roof is perhaps the home's most outstanding feature. Steel rafters spanning across one large curved central beam act as the spine upon which the plywood roof sits. The wood was sprayed with synthetic neoprene rubber, a resilient water-resistant material. →



Native plants grow on the earth-covered roof that provides fire resistance, thermal insulation and helps the home blend into the surrounding environment. The living spaces look north out to a pond that continues the home's connection to the environment.

Homeowner Tyrone crafted the kitchen's polished concrete benchtop himself. The stainless steel rangehoods were sourced from Qasair and the designer pendant light shades from Volker Haug. Salvaged blackwood was used for the bookshelf and lines the kitchen bench.

A wood-fired heater sits beneath a stone fireplace. Tyrone and his father hand-cut the stone before crafting the living room's hearth.

Above this, several layers of geotextiles help stabilise and provide drainage for the roof. Lastly, plastic webbing acts as a container for the soil and the plants in it. Eight tonnes of earth sit on the roof, with a green carpet of 4500 native grasses planted into it.

"I always wanted to build an underground house, but this site was not suitable for it," Tyrone reflects. "The architect picked up on that and said it could be earth-covered rather than buried in the ground. He came up with the shape and it sold me."

With the imposing Yarra Ranges in the background, an earth-covered roof is both aesthetically and naturally a delight, as well as an excellent form of insulation and a bushfire retardant. But the cost was considerable – the couple spent five times what they would have on a more conventional roof and were forced to borrow money to complete the house.

Despite this, there is little that Tyrone and Hailey are not happy with about their new home. Their planning and research were thorough, including the incorporation of five criteria – cost, aesthetics, function, feng shui and sustainability – which they used to evaluate each aspect of the build. Alvyn has found that the home performs thermally even better than expected, and the couple's hard work has paid off in an exceptionally considered and sustainable home. "It's the way they went about doing the work ... [building] sites are mostly full of machinery, but on this site so much was done by hand. It's quite amazing," comments Alvyn.

For Hailey, the graceful energy and feel of the home are worth the involved, and at times stressful, process of building. "It was a fantastic opportunity to start from a clean slate," she says.

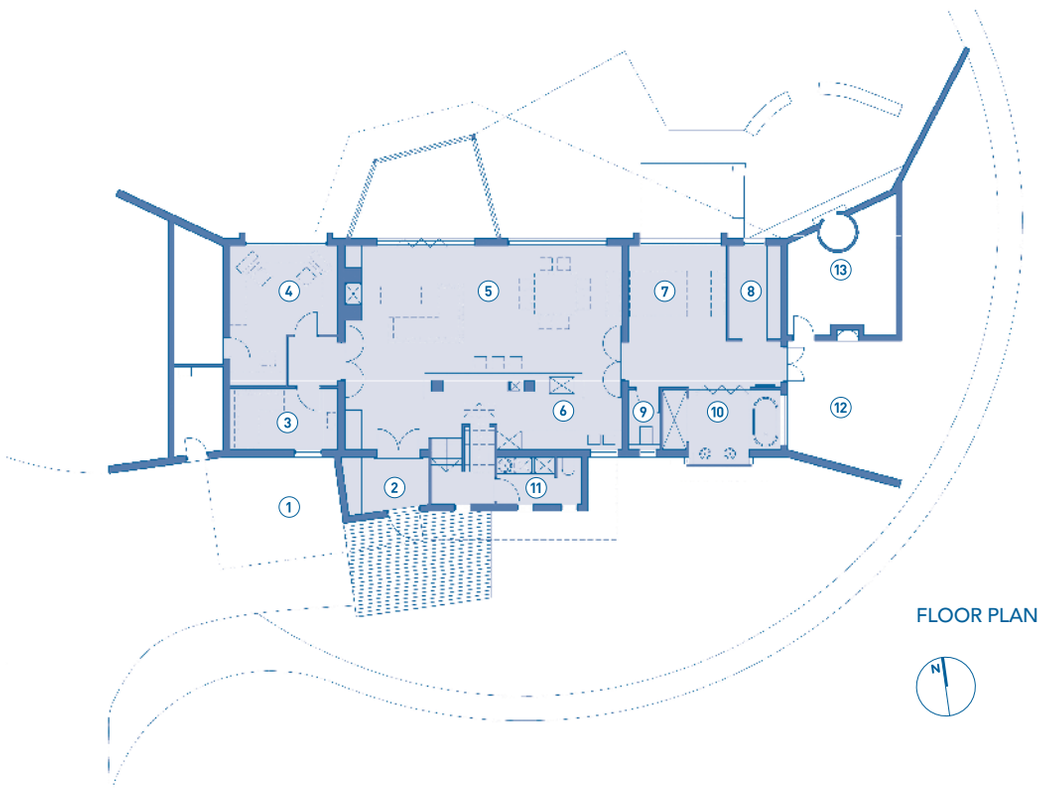
Tyrone is proud of the fact that meticulous reuse of materials meant just three trailer loads of rubbish were taken off the site. Throughout the whole build process, the right people turned up when we needed them, he says. "One of our goals was to enjoy the process. You don't get the privilege to do this many times in your life."

The main bedroom sits at the east end of the house, while Hailey's office and a lounge lie at the western end below a mezzanine-level bedroom and TV room for guests.

A blackwood bookshelf sits inside the living room near the entrance. Blown glass from Healesvillle Glass Blowing Studio features in the front door.

LEGEND

1. Carport
2. Entry
3. TV/Lounge
4. Office
5. Living/Dining
6. Kitchen
7. Bedroom
8. WIR
9. WC
10. Ensuite
11. Laundry
12. Courtyard
13. Pizza oven



FLOOR PLAN

Arch house

—Specifications

Credits

DESIGN
Alvyn Williams, Barry O'Brien & Sean Gallagher, Soft Loud House Architects

BUILDER
Tyrone Jaspers

LANDSCAPE DESIGN
Phillip Johnson

PROJECT TYPE
New build

PROJECT LOCATION
Warburton, VIC

SIZE
215 sqm

BUILDING STAR RATING
7.3 Stars

Sustainable Features

HOT WATER
– Apricus evacuated tube solar hot water, boosted by Rinnai (LPG) instantaneous hot water unit.

WATER SAVING
– Water efficient appliances and fixtures
– Two concrete tanks provide 22,000L water storage in lieu of mains supply.

PASSIVE DESIGN
– Earth sheltered roof, supplemented with Earthwool R5 ceiling insulation and Formcraft ICF walls
– R2.5 batts and R2 Aircell in stud walls
– No cooling system installed.

ACTIVE HEATING & COOLING
– Hydronic slab heating using a Sime high efficiency boiler and Cheminee Phillipe 'Radiante 705' wood heater
– Evolution (DC fan) by Big Ass Fans.

BUILDING MATERIALS
– FormPro Polystyrene concrete forms by Formcraft Australia
– Deco rock walls; stone sourced from Castella Quarries
– Elmich Green roof system
– Concrete benchtops by Tyrone Jaspers
– Local stone abundant on the property used for natural fieldstone walls
– Salvaged timber from Bowerbird Saved Timber was used throughout the home.

WINDOWS & GLAZING
– Fire resistant timber window frames by B.J. Williams of Bayswater
– Double glazing by S.O.S Glass.

LIGHTING
– Compact fluorescent and Cree LED downlights from Solarphase Alternative Power Solutions
– Stainless steel light shades in the kitchen were sourced from Ambiance Lighting Australia.

PAINTS, FINISHES & FLOOR COVERINGS
– Haymes paint throughout interior
– Natural honed Travertine floor tiles
– Grimes & Sons Cement Render
– Porters Rust paints.

OTHER ESD FEATURES
– North orientation and window/sunroom design for winter solar gain and summer shading
– Minimal plan depth north-south for solar penetration
– Small south-facing windows to minimise heat loss and gain
– Airlock entrance to minimise energy loss
– Earth-covered roof for fire resistance and thermal insulation
– Native plants supplied by Kuranga Native Nursery
– The meticulous reuse of materials meant just three trailer loads of rubbish were taken off the site throughout the build process
– Homeowner Hailey was assisted by design consultants Mark Fenech and Michelle Piggott in the interior fit-out.

A Castella stone wall surrounds the entry on the home's southern side. In the garden, stone from the property was used for natural fieldstone walls. LED downlights are used throughout the interior and exterior.

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Reusing old building materials was an emphasis of the restoration of this heritage listed building. Existing bricks were maintained or reused in the external walls. Floorboards from the old warehouse were used for the studio as external cladding. A studio sits next to the main house.

Ageing beauty

Most people wouldn't contemplate converting a heritage listed derelict warehouse into a liveable home, but for one architect the conservation project made perfect sense.

WORDS Rachael Bernstone
PHOTOGRAPHY Peter Booth

WHEN ARCHITECT PETER BOOTH AND his partner, a visual artist, spotted a disused warehouse in the centre of Hobart, they saw opportunity where others saw only ruin and decay.

"The warehouse was basically a derelict shell," recalls Peter. "The timbers had rotted away from the walls, there was no mortar between the bricks in some places so the walls had crumbled away, and the downpipes were not connected to the gutters so there was an internal waterfall. You definitely wouldn't live there if you didn't have to."

The two buildings and central yard had most recently been used by a builder for storage. "As we commenced our demolition and excavation, we discovered signs that it had been used as a warehouse for over 100 years," says Peter. The original building dates from the mid to late 1800s, and the heritage listing added to the perceived degree of difficulty in restoring or adapting the structure for modern use.

Despite these challenges, Peter saw value in transforming the building into a better-performing and more liveable home and studio. "It's quite important for me as an architect to make the most of buildings in the city; to take a responsible attitude towards consolidating the buildings we have, without building more in the suburbs," he explains.

Before buying the property the couple met with the heritage council. The council stipulated that the original brickwork should be maintained where possible and the new roof should be galvanised corrugated sheet, instead of the more typically used coated or pre-painted products that offer a longer lifespan. "We outlined our plan to reuse a lot of the existing building materials, and the heritage council was happy with that," says Peter. "It was seen as a good way of going about reusing the structure." →

The northern side of the main building has been opened up with double-glazed windows and doors to capture sunlight.

As the largest project the design duo had undertaken, they were keen to not overcommit financially. The smaller of the two buildings was converted first, enabling them to move into the studio and save on rent while work continued on the larger building across the courtyard.

The larger building faces northeast, so Peter opened up the main wall with double glazing to bring in light and warmth, and split the building into two zones – the northeastern end houses the living spaces and mezzanine main bedroom above, while the garage lies at the southwestern end, with two guest bedrooms and a bathroom above. "This gave us a primary space to occupy, so we could close off the other bedrooms and not heat them, unless we had guests to stay," he says.

The building needed much restoration work to make it habitable, including modern insertions such as super-insulation, nine skylights and double glazing to make it comfortable in Hobart's cold winters. However, Peter was respectful towards the original structure.

"During demolition, we salvaged everything, so we were able to use the floorboards from inside for external timber cladding, and our internal doors and frames were made with timber from the original building too," he says. The windows were also made using recycled timber.

While Peter was keen to incorporate ecological design elements, he was constrained by the tight footprint and the heritage structure, which precluded some typical add-ons, such as rainwater tanks and solar power.

"In the CBD, we can readily tap into existing infrastructure, so we opted for mains water with the most efficient water fittings we could afford for taps, toilets and showers," he says. "And because all of Tasmania's power is green – hydroelectric – and we wanted skylights, and there is no gas line in the street, we opted for two small and efficient electric hot water systems – one in the studio and one in the main building. These are close to the outlets so we don't waste heat or water in transport." →

"It's quite important for me as an architect to make the most of buildings in the city; to take a responsible attitude towards consolidating the buildings we have, without building more in the suburbs."
Peter Booth

The warehouse before architect Peter and his partner began restoration work.

Designer Peter Booth found recycled hardwood floorboards for the first floor from a demolished scout hall in northern Tasmania. A concrete slab soaks up the sun's heat and high insulation levels in the walls and ceiling limit heat loss.

Taking the view that the building might be rented, Peter installed ducted reverse cycle air-conditioning. However he says the northeast orientation, double glazing and thermal mass in the brick walls and concrete floor combine to provide warmth throughout the day and into the evening, without the need for further mechanical heating.

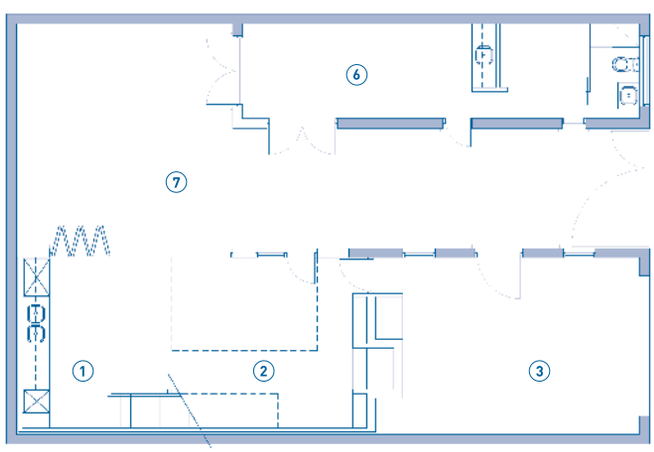
As the owner-builder on the project, Peter admits it was a long, slow and sometimes testing process. "We bought it in 2008, settled in February 2009, and it took us nine months to get the studio habitable and install services – sewer, stormwater, power – for the main building," he recalls. "Then we had tools down for about six months to take a break prior to the next stage, before building for another 18 months, while working in our other jobs as well.

"I was confident from the outset that we could do it, but my partner probably wasn't aware of what we'd bitten off," he laughs. "But what she initially lacked in skills she made up for in enthusiasm, and in the end it was a very rewarding process."

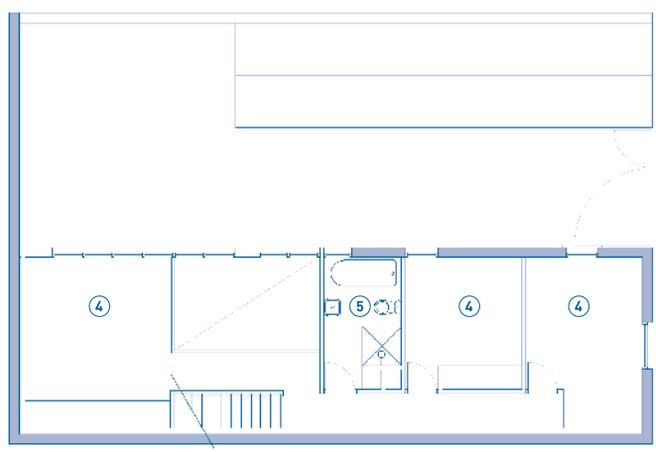
LEGEND

1. Kitchen/Dining
2. Living
3. Garage
4. Bedroom
5. Bathroom
6. Studio
7. Courtyard

FLOOR PLAN



GROUND FLOOR



FIRST FLOOR

Harrington house

—Specifications

Credits

DESIGN
Booth & Watts

BUILDER
Owner-builder

PROJECT TYPE
Renovation

PROJECT LOCATION
Hobart, TAS

COST
$320,000

SIZE
House 160 sqm,
land 189 sqm

Sustainable Features

HOT WATER

– Dux 250 ProFlow electric hot water systems fully insulated and installed internally in the studio and main house.

Architect and homeowner Peter Booth explains that due to heritage constraints, solar hot water and solar power were not an option. Because of Tasmania's hydro power and no gas line into the property, electric hot water systems were the best choice.

WATER SAVING

– All tapsets are WELS 5 star (6L/m); showerhead is WELS 3 star (9L/m).

PASSIVE DESIGN

– Double-glazed north-facing wall to maximise solar gain
– Velux skylights to all rooms increase solar gain and allow for purging of hot air as required
– Main bedroom mezzanine over the living/kitchen area minimises the area requiring active heating.

INSULATION

– Roof insulation achieves R7.5 total with:
  - Bradford R1.5 Acousticon Faced Glasswool Blanket
  - Bradford R2.5 Soundscreen batts 90mm
  - Bradford R3.1 Soundscreen batts 110mm
– External walls achieve R6 total insulation value with two R5 Bradford Soundscreen batts
– Internal walls achieve R3 total insulation value with R2.5 Bradford Soundscreen batts.

ACTIVE HEATING & COOLING

– Reverse cycle air conditioner installed. Peter explains that the current tenants use this for just 20 minutes in the morning during winter.
– Heatmaster open wood fire.

BUILDING MATERIALS

– Existing bricks reused
– Reclaimed bricks from demolition stage used for walls
– Reclaimed structural hardwoods from demolition phase used for roof structure, new exposed floor structure, internal doors and door frames
– Recycled hardwood floorboards sourced from the demolition of a scout hall in northern Tasmania
– New glue laminated structural hardwood beams fabricated from offcuts and shorts
– Polished concrete floor.

WINDOWS & GLAZING

– Velux high performance double-glazed skylights
– Timber framed external window frames fabricated from recycled timber by Woodn't It Be Nice
– Viridian Thermotech Comfort Plus double glazing
– Breezway Altair louvre windows with 6mm toughened glass with a low-e coating.

PAINTS, FINISHES & FLOOR COVERINGS

– Dulux low VOC Wash & Wear paint
– TasPaints waster-based polyurethane applied to all timber surfaces.

Natural light floods through large north-facing, double-glazed windows and nine skylights into a mezzanine bedroom and open plan living and kitchen area below. New glue laminated structural hardwood beams were fabricated from timber offcuts and shorts.

The simple life

The pared back design of this modular home promotes sustainability, simplicity and liveability.

WORDS Jacinta Cleary
PHOTOGRAPHY Brendan Finn

"The house was so lovely to live in last summer; it just stays quite comfy in the heat. We'll add some drop blinds on the east for more shade though."
Designer and homeowner Robyn

This modular 7.8 Star home sits on an east–west axis with large north-facing double-glazed windows that let sunlight flood into the home for passive solar design.

DESIGNERS ROBYN GIBSON AND PAUL Hassall had an ambitious plan: create a small, energy efficient home for people who don't want to go through an extensive design process. The couple had created numerous one-off homes as the team behind Castlemaine's Lifehouse Design, but saw a gap for a streamlined and adaptable modular home.

Over four years they developed a concept and refined its design to produce a space-efficient home based on versatile 3 by 5.4 metre modules. It's not delivered in sections like a prefabricated home, but is built entirely on-site.

Once their concept was honed it was time to build a prototype. It was also a chance for the couple to create their own peaceful home, to downsize and step back from their busy lives. They found a block at Campbells Creek near Castlemaine in central Victoria, a semi-suburban area with the quiet of the forest a five-minute walk away. The 710-square-metre lot is on an east–west axis providing a generous northern side for passive solar design. "We wanted to prove you could build something environmentally sustainable on a small site," says Robyn.

The concept's simplicity is evident in the linear layout of the new Campbells Creek home. The house is only as big as it needs to be, providing the shell for an uncluttered life. Their personalised rectangular plan comprises six design modules in a row, creating a compact 90 square metre home. Side by side are the bedroom, study, bathroom and an open plan living, dining and kitchen area. No more, no less.

With such a pared back design, there are no excess materials or unnecessary details to increase costs. The exterior is modern and light with timber walls and an unobtrusive flat roof. Paints and varnishes have barely been used. The house is constructed from materials that look beautiful in their natural state, such as the trowel-finished concrete slab and the silvertop ash walls simply finished with natural oil. The rear south wall is designed around entire compressed fibre cement sheet panels to reduce waste and labour costs. The full-sized sheets can be unscrewed and reused if the house is ever dismantled. →

The southern wall is made of CSR Cemintel Barestone compressed fibre cement sheet with a natural finish. Silvertop ash cladding is finished with a natural oil.

Structural plywood was used to line the ceilings throughout the home. It was also used for shelving in the hallway, the living area and for the bathroom unit and robe doors.

Inside, the home's long, narrow form allows air to flow easily from one end to the other. "We've designed it as one long pavilion to really maximise the northern aspect and to get good ventilation," says Robyn. Casement windows throughout the home help catch the breeze on warm nights. "The house was so lovely to live in last summer; it just stays quite comfy in the heat. We'll add some drop blinds on the east for more shade though."

The home runs the block's southern length and as a result the concrete slab is flooded with the sun's natural warmth on clear winter days. Sun also hits a blockwork feature wall in the living area, which stores additional heat from a strategically placed wood-fired stove in front. These passive design features of mass and northern orientation help to naturally warm the home, and a small floor plan ensures it happens quickly. Winter days in Castlemaine can be clear and crisp, with Robyn arriving home one sunny afternoon to a balmy 22 degrees Celsius inside thanks to a good dose of sunshine hitting the slab. "We just don't need much heating. We find when we do light the fire it just heats the whole house."

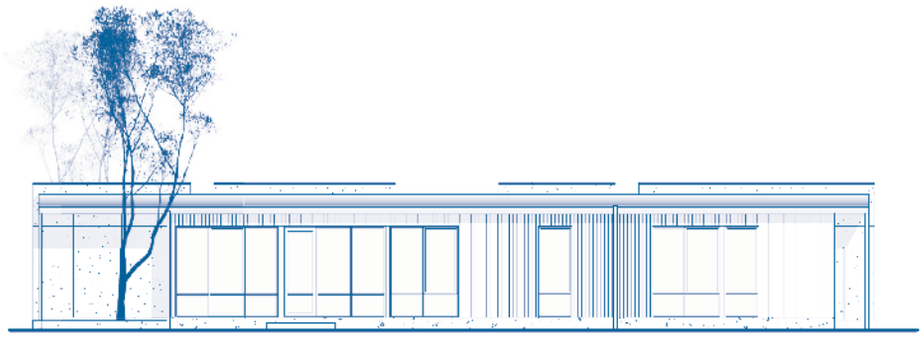
The home retains heat in the cool months due to high levels of insulation in the roof, walls and double-glazed windows throughout. Its house energy rating was boosted to 7.8 Stars with the choice of a waffle slab; the concrete was poured over a layer of pods that help insulate the slab from the ground's temperature changes. The 2.2 kilowatt solar photovoltaic system covers the home's low electricity needs. →

A 600mm-deep spine running along the southern side of the house (to the right in the image) fulfils different purposes in each room, including a window seat in the living room, wardrobes, cupboards and a desk in other parts of the house.

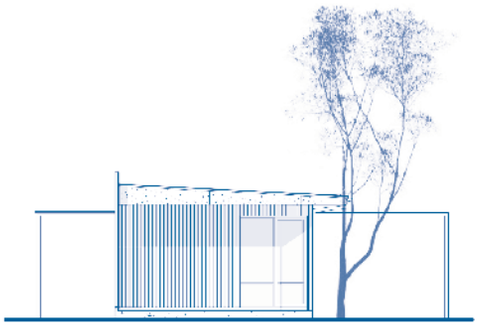
The home's passive design, including thermal mass and double-glazed windows along its northern side, helps to naturally warm it in winter. The small floor plan ensures it happens quickly. A wood-fired slow-combustion heater adds additional warmth.

One of the challenges of designing a small dwelling is creating storage space while maintaining a clean layout. A clever design feature is a 600mm-deep 'spine' that runs along the south of the house, fulfilling different purposes in each room such as a wardrobe, cupboards, desk and window seat. "Architect Glenn Murcutt and others have been designing houses in this way for many years, but the way it applies to our very small house is very effective and a lovely design feature."

"There's a simplicity with living here, it's just quite beautiful," says Robyn of her new home. "I love its warmth and lightness on winter mornings, the flow of spaces, and the textural interest created by the mix of finishes and materials." It seems this building designer has created her ultimate place, an elegant, uncomplicated abode, and one that's intended for others to replicate and enjoy.

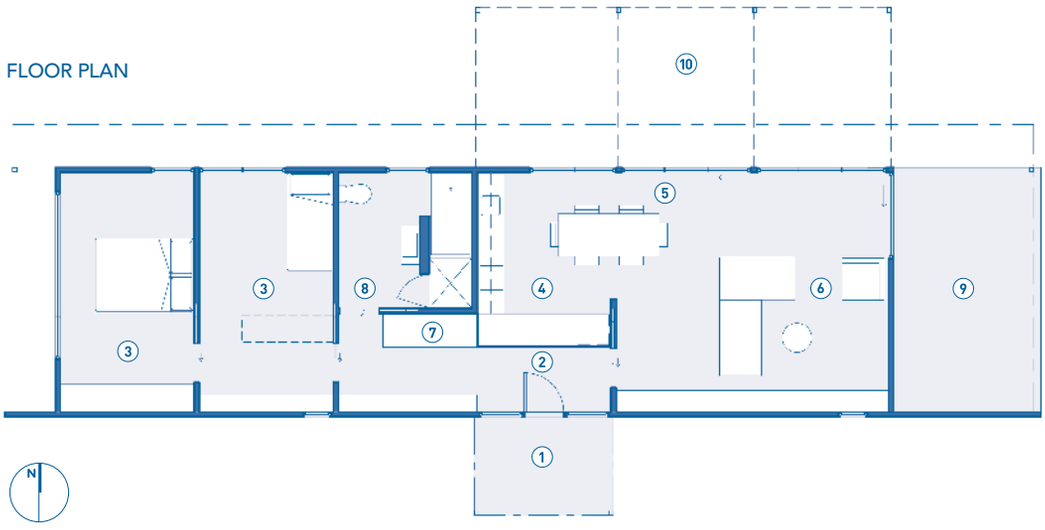


NORTH ELEVATION



EAST ELEVATION

FLOOR PLAN



LEGEND

1. Porch
2. Entry
3. Bedroom
4. Kitchen
5. Dining
6. Living
7. Laundry
8. Bathroom
9. Verandah
10. Pergola

Campbells Creek house

—Specifications

Credits

DESIGN
Robyn Gibson & Paul Hassall, Lifehouse Design

BUILDER
Vic Restorations Building Services, Castlemaine

JOINER
AG Kitchens, Harcourt

PROJECT TYPE
New build

PROJECT LOCATION
Campbells Creek, VIC

SIZE
90 sqm
+ 30 sqm shed/studio

BUILDING STAR RATING
7.8 Stars

Sustainable Features

HOT WATER
– Rinnai Infinity 26 Enviro (26L/min) continuous flow gas boost unit.

WATER SAVING
– 16,500L corrugated steel rainwater tanks.

PASSIVE DESIGN
– Small overall footprint
– Modular home built on an east-west axis with north-facing glazing to maximise northern sunlight into the home
– Concrete slab and internal blockwork wall as thermal mass
– Narrow floor plan, casement-style windows and ceiling fans to maximise cross ventilation
– 1.2m eave on north for summer shading of windows
– High insulation levels throughout.

ACTIVE HEATING & COOLING
– Metro Wee Rad wood-fired slow combustion heater in living area
– Electric panel heaters added as supplementary heating in study/living areas.

BUILDING MATERIALS
– Waffle concrete slab on ground, high trowel-finished and sealed with a natural oil
– Lightweight timber stud walls
– Timber truss roof structure
– Zincalume traydeck roof sheeting
– Radial Timbers' silvertop ash shiplap timber cladding
– South wall (and shed/studio building) of CSR Cemintel Barestone compressed fibre cement sheet with a natural finish
– Laminex laminate used for kitchen and hallway cupboards over E0 emissions rated board
– Structural hoop pine plywood used for bathroom unit, robe doors, hallway shelving, and all living area joinery
– Painted plasterboard walls internally generally
– Structural plywood ceilings throughout (including eaves and verandah).

INSULATION
– Stud walls insulated with R2.7 Knauf Earthwool batts & Air-Cell Permishield insulated blanket
– Roof insulated with R6.0 Knauf Earthwool batts & Air-Cell Glareshield insulated blanket.

WINDOWS & GLAZING
– Valley Windows hardwood frames
– Double-glazed glazing units throughout.

LIGHTING
– LED lighting from About Space, Fitzroy
  - 3 watt LED exterior wall lights
  - 5 watt LED strip lights to kitchen overhead shelves.

PAINTS, FINISHES & FLOOR COVERINGS
– Livos Kunos Natural Oil sealer applied to slab and plywood ceilings; Alis Decking Oil applied to silvertop ash cladding and hardwood windows and doors
– Haymes low VOC paint throughout the interior
– Granite Rustic Sisal carpet on 9mm recycled cotton carpet underlay by Floorspace, Camberwell.

OTHER ESD FEATURES
– Modular design to produce less waste during the construction process
– Materials and finishes require little or no finishing
– Built on-site to promote local/regional social sustainability.

The modular home was constructed on-site to promote social sustainability by involving local builders and tradespeople.

Visit a sustainable house in your neighbourhood

Sunday 8th September

SUSTAINABLEHOUSEDAY

Visit the website for house locations & details

sustainablehouseday.com

Presented by

ENVIRO(SHOP) · YINGLI SOLAR · Apricus Australia SOLAR HOT WATER · GREEND · AUSTRALIAN SOLAR COUNCIL THE NATIONAL VOICE OF SOLAR

EnviroShop & Apricus Solar Hot Water are proud to be sponsoring Sustainable House Day on September 8th. Supporting efforts to showcase some of Australia's most sustainable homes is something that comes naturally to us. After all, while EnviroShop's founder helped pioneer the Australian sustainable living movement over 30 years ago, Apricus have been at the forefront of Solar Hot Water for years, including the latest evacuated tube technology.

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Sustainable House Day

SPECIAL

2018

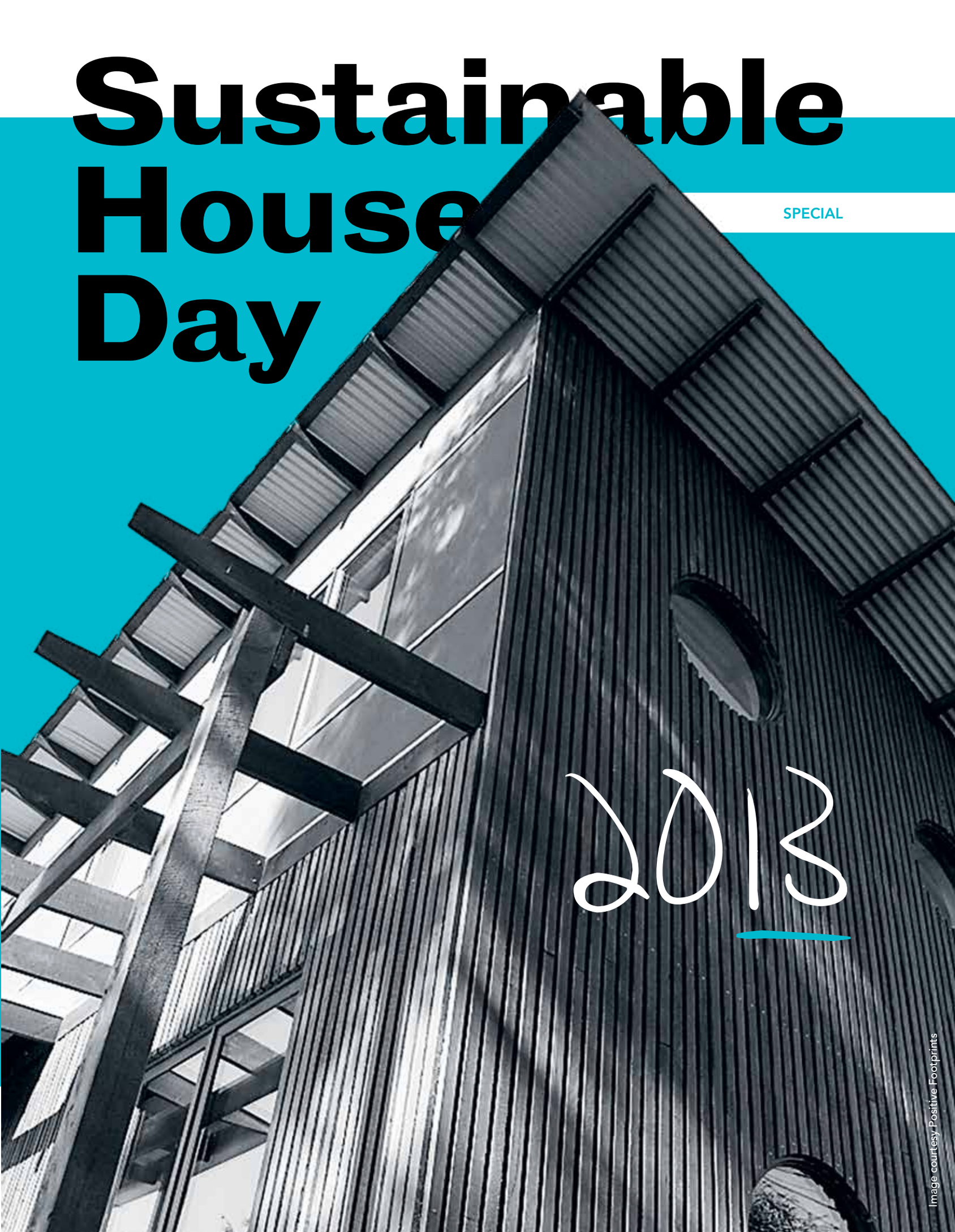

Image courtesy Positive Footprints

Sustainable HOUSE DAY

8TH SEPT
2013

DOORS WILL OPEN TO CURIOUS CROWDS for Sustainable House Day (SHD) on 8 September 2013.

Homeowners around Australia are aided by community groups and volunteers as they set this Sunday aside to guide visitors through their homes in the name of sustainable design and living.

Solar passive house design, energy efficient appliances, solar power and solar hot water, sustainable products and innovative and recycled materials are just some of the features you can expect to see in homes on the day. It's a chance to see what resourceful homeowners, whether they are owner-builders, renovators or designers, have done to make their homes energy efficient, environmentally responsible and built for life.

It's the homeowners who really make SHD a success. They share their triumphs, challenges and their learning experiences from their journey to create a liveable and sustainable home. Many have found past SHDs so helpful for their own projects they are happy to share their own experiences.

"We opened for Sustainable House Day in 2012 to allow other people to benefit from our learnings as we have learnt from others. We also wanted to show people that building a sustainable house is not a daunting task," says Melbourne homeowner Peter Whelan.

Running since 2001, the day always attracts thousands of visitors. In 2012, over 200 homeowners opened their doors to over 40,000 visitors around Australia. This year, a similar number are expected to open again. The 2013 event will also feature some special events. In Western Australia, Josh Byrne will officially launch his Josh's House Project. In South Australia, the Zero Carbon House will be open for the first time to the public and in the ACT a people will be able to visit a carbon zero dairy farm.

This SHD special features houses from around the country that will open this year or have opened in the past. Inside, you'll also find tips on the basics of sustainable design.

Sustainable House Day 2013 is proudly presented by the EnviroShop. It is also supported by Yingli Solar, Apricus and Greend.

MELBOURNE PERTH GOLD COAST TROPICS ADELAIDE SYDNEY

Tips for a sustainable home

Sustainable design is really just common sense.

BUILDING OR RENOVATING A HOME can be one of the most challenging – and rewarding – experiences in a person's life. The results will be with you for years, and perhaps a lifetime, so getting it right from the beginning is crucial.

Here's our list of things to consider when designing, renovating or making small improvements to your sustainable home.

CREATE A COMFORTABLE HOME WITH PASSIVE DESIGN

A passively designed home makes the most of natural heating and cooling methods to keep its occupants comfortable year-round. Orientation, spatial zoning, thermal mass, ventilation, insulation, shading and glazing are the seven core components of passive design, explains sustainable designer Dick Clarke of Envirotecture.

Orienting your home correctly is particularly important in temperate and cool climate zones. When a building is able to let the sun in during cold seasons and shut it out when it's hot, the other six principles of passive design can be balanced to create homes that require minimal active heating or cooling. Good orientation from a passive design perspective generally means locating living areas on the north side of the house, with glazing having clear access to sunlight even in mid-winter.

DESIGN FOR YOUR CLIMATE

Different climates need different houses. Australia has more than 80 climate zones but these are often simplified to eight, ranging from tropical to alpine. Make sure you employ a designer who is familiar with your zone and who designs climate-appropriate buildings – for instance lightweight and ventilated in hot, dry climates; well-insulated and with good solar access in cool climates.

In tropical and hot, dry climates, orientate the house to exclude the sun year-round and to maximise cross-ventilation. In all other climates, your aim should be to minimise summer sun and maximise winter sun, which basically means a northern orientation. Couple your passive solar design with thermal mass (materials such as concrete that absorb heat energy, or a 'proxy' such as a phase change material) to retain the warmth of winter sunlight and/or the cool of summer shade.

DESIGN FOR LIFE

Make sure your home is designed for the long haul, and that its materials are durable and able to be easily reused or recycled. Crucially, when designing your house, think ahead. Will your family grow, will it shrink or will it stay stable? How will your own health impact your needs in 10 or 20 years time? With these things in mind, you can design a house that not only meets your current needs, but can adapt to your changing needs without you later incurring the cost of an extension or renovation.

This approach doesn't only apply when you're designing a new home; it is relevant when you choose appliances for your kitchen, furnishings and more. →

Image courtesy Ink & Spindle

SIZE MATTERS

Australians have some of the biggest houses in the world. Yet the smaller a home, the easier it is to achieve higher energy efficiency standards, and the lower the upfront and ongoing costs, says Trivess Moore, research fellow at RMIT's College of Design and Social Context.

SMART HEATING AND COOLING

Active heating and/or cooling may be necessary in many Australian homes but don't rush to buy a heater or air conditioner when you may not need one. First, consider how you can improve your home to make it more comfortable. Australian homes are traditionally 'leaky' and draughts can be responsible for up to 25 per cent of your heating costs – a similar amount if you air condition. Seal any leaks, use curtains and blinds, make the most of the sun's heat and shading to moderate your home's climate, and insulate. If you need air-conditioning, make sure you also have ceiling fans, which significantly increase its efficacy.

INSULATE

One of the most effective ways to save money on energy bills and make your home more comfortable is to insulate. Insulation acts as a barrier, preventing heat passing in and out of a house. By reducing this heat flow you can more easily maintain a comfortable temperature inside, regardless of the temperature outside. In winter, once your home has been heated to a comfortable level, it will stay that way with less energy input than an uninsulated home. In summer, an insulated home will take longer to heat up, requiring less energy for active cooling. Insulation is not just limited to the roof – you can insulate your walls and floor for maximum energy efficiency.

BE ENERGY SMART

Lighting makes up about 11 per cent of the energy consumed in a typical home, about the same as refrigeration. Households can reduce energy use for lighting by 50 per cent or more by making smart lighting choices and using more efficient technology. Spending a little time and effort to get the lighting right in your house can save you money on energy bills and make rooms more comfortable and enjoyable.

It is important when considering the energy consumption of lighting to look at wattage, not voltage. Wattage measures electrical power, while voltage measures the electrical pressure or force a device runs at. Some bulbs, especially halogen downlights, are sold as 'low voltage', with many people thinking this equates to low energy consumption. This is not the case. The important factor is the power rating – 50 watts, for instance, is exactly that regardless of the voltage at which it is supplied and used.

USE SUSTAINABLE MATERIALS

Your choice of building materials can have ramifications far beyond your home. Inappropriate use of materials in building means one thing: waste. All materials have an embodied energy, which is the energy used over their lifecycle, from processing of raw materials, to manufacturing through to product delivery. If you build your house with poorly chosen materials, their embodied energy could diminish or cancel out the benefits of years of sustainable living.

Generally, the more processed a material is, the higher its embodied energy. So choose sustainably sourced timbers, recycled and locally sourced materials, and low volatile organic compounds (VOC) paints and finishes. When building, keep material use to a minimum. If you're renovating, reuse what you can from the pre-existing building.

Recycled bricks and timber were used in the redesign of this Melbourne home by Breathe Architects. Image: Andrew Wuttke

WINDOWS

Windows and glazed doors can let in (and out) substantial amounts of heat. So even if you've installed insulation, go for double glazing. As a general guide, the total window area of your home or a room should be less than 25 per cent of the total floor area. Most windows should be located on a home's north side where good solar access is easiest to manage.

BE WATER WISE

Use three or four WELS star-rated shower heads, toilets and water fixtures. Catch your rainwater in tanks for use in the bathroom and garden and look into getting a wastewater treatment system. Use drought-tolerant landscaping.

SELECT EFFICIENT APPLIANCES

An inefficient appliance can mean a lot of wasted energy as well as more heat in your home – which can be a problem in summer or in hotter climates.

When looking for an appliance, try to select the most efficient one that meets your needs and budget. Don't forget to check product reviews – a high-efficiency appliance that has a high early-failure rate will cost you and the planet more in the long run.

STAY ENGAGED

Stay tuned in to your home – its needs and yours – to make the most of passive solar design. Open and close blinds, doors and windows to let sunlight and breezes in or keep them out. Remaining engaged can help lessen your environmental impact and ensure your home is performing as well as it can, all the time. "As a sailor adjusts the sails on a yacht, sail your home through the year's changing climate, working with the forces of nature to power its natural comfort," says Dick Clarke.

This Melbourne 8.6 Star home is on a tight block that looks north across the street. Raising the thermal mass and the living areas to the upper floor, and using cleverly placed voids to bring light to the ground floor, made the most of the tricky site.

Junction house

PROJECT TYPE
New build

PROJECT LOCATION
Seddon, VIC

DESIGN & BUILD
Positive Footprints

A Melbourne couple opened their home for Sustainable House Day in 2012 to show others that building a sustainable house is an enjoyable and gratifying experience.

WORDS Beth Askham
PHOTOGRAPHY Simon Black

PETER AND SALLY LOVE LIVING IN THEIR INNER-CITY newly built 8.6 Star energy-rated home in Melbourne's west.

The house was designed by Peter, Sally and Melbourne-based building design firm Positive Footprints. Sustainable features include double-glazed windows that let the winter sun in to warm the upstairs suspended concrete slab. In summer the same slab keeps the house cool – even though it tipped the couple over their budget, they think it was worth it.

The house also has good insulation, water-saving taps in the bathroom, bamboo flooring and stairs, and LED lights that reduce their energy bills. The backyard is alive with raised garden beds and rainwater tanks.

"We set out to make the home sustainable for a number of reasons: to feel good when we hear the rain pour into the water tanks, get hot water from the sun, make a long term investment for our retirement to reduce bills (which we have already benefitted from), have a clean house with materials with no noxious fumes, but most importantly, to reduce our carbon footprint," says Peter.

Peter and Sally enjoy their low energy bills and love that their home maintains a constant comfortable temperature and is warm on winter mornings. The sunlight that pours through the double glazing and the joy of having a bath in water heated by the sun are just some of the pleasures of their new house, he says.

Family visitors from the country often come to stay. Peter says the kids love the balcony and the quiet cul-de-sac where they can ride their bikes safely.

Peter and Sally opened their new home to visitors as they wanted others to benefit from their positive building experience. Peter has some frank advice for people who are considering building or renovating: be bold and don't scrimp on important measures like double glazing. "Work out your vision and your vision may not be that hard to reach," he says.

Polished concrete slab floors upstairs and downstairs provide thermal mass in this highly insulated home with a tight building fabric. Double-glazed windows and doors have FSC European Redwood timber frames.

Perth's Green Swing

A small-scale urban development in Perth shows that sustainable home design and building is a perfect fit for medium density living.

PHOTOGRAPHY Sebastian Mrugalski

FIVE KILOMETRES FROM PERTH'S CBD, THE GREEN SWING development includes two townhouses and two apartments all rated as super efficient 8 to 10 Star homes. The small-scale development has small building footprints and large communal outdoor spaces.

One townhouse is reverse brick veneer and the other is strawbale combined with reverse brick veneer. The two apartments are both insulated double brick.

As high energy-star rated homes, the dwellings should require no mechanical heating and cooling to keep their occupants comfortable. Concrete slabs and brick walls are combined with high levels of insulation and double glazing to hold the sun's heat in winter. Windows to the south allow for sea breezes and natural ventilation to cool spaces in summer.

Mark Dowley lives in the reverse brink veneer townhouse with his wife Alana and their three kids. Mark and Alana are co-founders of the development alongside Helmuth and Eugenie Stockmann. Mark's family have lived in the house for around six months.

A strawbale (pictured right) and a reverse brick veneer townhouse are part of The Green Swing. It's not just the garden that allows the householders to share spaces; other features include a communal courtyard between building entrances and garages that do not open directly into the houses, but require residents to use their front doors.

An exposed brick wall reveals reverse brick veneer construction. The strawbale wall on the right is finished with a soft, earthy-looking render.

In winter the house performs wonderfully, says Mark. “You don’t realise the cool temperatures until you step outside.” In summer the house hasn’t performed as well as they expected as there are still finishing touches to be made, including awnings over downstairs windows and deciduous garden trees that will provide shade in summer once they are fully grown.

“The nice thing about the new development is that you have close neighbours and lots of garden space,” says Mark. “Yesterday, there were three different sets of kids running all over the block, which is really nice. The family spends a lot of time outside.”

Mark is interested in building more developments like this in the future. “I would love to see more developments in this style being built, giving a suburb a different feel,” he says.

All dwellings in The Green Swing have flat plate solar hot water and solar photovoltaic systems. The townhouses each have a 4500 litre metal rainwater tank while the apartments share a 4000 litre poly tank. The block also borders onto a community garden Green Swing residents have established next door in partnership with a local community garden association. The garden is located over a stormwater drain owned by the local council.

At a recent open day, over 200 people came to visit The Green Swing. The homes will be opening again for Sustainable House Day 2013.

LINKS

thegreenswing.net

PROJECT TYPE
New build

PROJECT LOCATION
Lathlain, WA

DESIGN
Griff Morris,
Solar Dwellings

BUILDER
Right Homes

Treehouse retreat

The chance to peek into treetop living at Currumbin Ecovillage, seven minutes inland from the Gold Coast, has been a Sustainable House Day highlight.

PHOTOGRAPHY Shantanu Starick

PROJECT TYPE
New build

PROJECT LOCATION
Currumbin Ecovillage, QLD

DESIGN
Rob Norman, Symbiosphere

INTERIOR DESIGN
Sally Stent, Refound

WHEN THEY WALK PEOPLE THROUGH THE TALLOWOOD Treehouse, building designer Rob Norman and interior designer Sally Stent show people through a house with a difference.

Homeowner Heike has happily opened her doors on Sustainable House Day to other homeowners interested in sustainable design. “I wanted to show my house so people could see that you can have a sustainable house that can be really stylish – you do not have to compromise anything,” she says.

Named after a lovely tallowood growing on the block, the treehouse is a spectacular home. The living spaces and verandahs look out over canopies of leafy Queensland gum trees.

Good design has ensured the house uses very little energy. It’s toasty warm in winter due to appropriate window placement and internal thermal mass and cool in summer, needing only ceiling fans to help move air around on still days. Other sustainable design features include rainwater tanks providing all house water, recycled hardwood telegraph pole floors, 60 per cent recycled slurry bathroom tiles, a 1.5 kilowatt solar power system, a solar hot water system, and a resource monitoring system tracking energy and water use.

Heike has no idea how many people have seen her home but knows that many have learnt from it. She recognises her ideas in other homes as friends ask ‘do you recognise that?’ and point out Heike-inspired features in their own homes. Contact details for tradespeople have also been passed around; a local furniture maker has had plenty of jobs as a result of people seeing his work there.

“It’s so simple to [build a sustainable home],” says Heike. “It’s not even rocket science – why don’t we all do it?”

Heike sees her home as a retreat with functional spaces and an atmosphere of wellness. There are nooks and crannies that make it cosy and indoor spaces have a real connection with nature. When you stand in the shower it’s like you are outside. “The living room and verandah open up and become one big space and the trees are right there.”

See *Sanctuary 15* for a full feature on this project
www.sanctuarymagazine.org.au

A slim compact footprint respected the sensitive ecosystem and meant no mature trees were felled in the home’s construction. 32,500 litres of rainwater storage are part of a raft of water saving measures in the home.

PROJECT TYPE
New build

PROJECT LOCATION
Redlynch Valley, Cairns

DESIGN
Edge Architecture

Tropical interaction

A family home designed for interaction and comfort in the tropics sits high above the leafy suburb of Redlynch Valley, west of Cairns.

OWNERS HAYLEY AND CRAIG BUILT THEIR HOUSE IN 2008 and say that its liveability is just as fabulous a few years later.

The whole house, shaped like a horseshoe, is only one room wide, with a connecting verandah running past each room. Louvre panels enclosing the verandah can be opened to let breezes flow through the house. The verandah also provides extra space for family interaction and meant rooms could be small, saving on construction costs.

From the street, the house looks a little different to others in the neighbourhood but there are surprises in the design. “Exposure to the hot western sun is minimised,” says architect Gordon Beath, of Edge Architecture. “There is a breezeway in the centre of the house to catch the south and south-easterly cooling breezes and the living spaces face northward towards the views.”

Connecting the home to its local environment was central to its design. Gordon says that breezes through the house keep the homeowners in touch with the temperature outside. Hayley adds that they hardly ever turn on the air conditioner they initially installed, using it for maybe three to four short bursts during the wet season. Power usage is minimised due to natural lighting prevailing throughout the house.

The pivoting louvres enclosing the verandah can be shut for security or when a cyclone approaches. During storms, air and rain is allowed to move through the louvres but any projectiles are stopped. Hayley says this helped the house get through Cyclone Yasi in 2011 completely undamaged, even though a whole tree had blown into their pool and their neighbour’s homes was damaged.

Gordon says the house was designed not only for thermal comfort but also for social comfort. The design makes it possible for Hayley and Craig to keep an eye on their young children from anywhere in the house, even when the kids are in the pool outside.

Most importantly, Hayley says the house is lovely to be in; the verandah leads you around from space to space and the harsh light from the tropical sun is softened as it shines inside. “I just can’t imagine ever moving out,” Hayley says.

Every room in the house has a view as the house is only one room wide. Aluminium louvres enclosing the verandah can be opened or shut for security or in a cyclone. Image: Gordon Beath

A good house

PROJECT TYPE
New build

PROJECT LOCATION
Adelaide Hills, SA

DESIGN
Mark Thomas, Goodhouse

The deck is a great gathering place for children, parents and clients as Mark works from home. Rainwater is collected in a 95 kilolitre rainwater tank. All wastewater from the house is recycled on-site.

An Adelaide home shows visitors that a cleverly designed home takes its environmental footprint seriously.

PHOTOGRAPHY Andy Rasheed

ARCHITECT MARK THOMAS, FROM SUSTAINABLE design company Goodhouse, was proud to open his home at Aldgate in the Adelaide Hills for Sustainable House Day. When he set out to build the house, Mark wanted it to be affordable and functional for his family of six. He also wanted the house to be as sustainable as possible.

To meet these goals the house is designed using passive solar design principles. In winter, sun pours through north-facing windows and warms the concrete floor and rammed earth walls. The warmth is then kept inside thanks to a highly insulated building envelope. If extra heating is required, it comes from an under-floor hydronic system that uses solar hot water boosted by a CO_2 heat pump. In summer the house is kept cool by ceiling fans, while well-placed windows create welcome cross ventilation.

Mark built his home to use fewer resources as he believes we all have a responsibility to do so. “I am not in this game because of my belief that sustainable housing is ‘nicer’ than the brick veneer alternatives. Clearly it is, but that is not my main motivation. We just have to do housing better in Australia. That’s why Oli [Scholz] and I launched Goodhouse.” he says.

“When you consider that Australia uses the most energy per capita in the world, our houses are too big and often inappropriately designed and constructed and there is no excuse. Well-designed and appropriately constructed houses cost no more than much of the current housing stock in Australia.”

Mark appreciates the home’s strong connections with the outside environment, its thermal comfort and overall environmental friendliness.

His advice for people who are renovating is to “investigate and monitor your home first, find out what the big-ticket energy consumers are and then plan the renovations around this information”. He says there is limited value in spending lots of money on double glazing if there is little insulation or changing the entire house to LED lights when there is an old electric water heater.

Asked if he would do anything differently were he to build his home again, he says there is always learning and refining to be done. “I have two rooms with a lightweight but insulated floor. If building again I would definitely build all the house on slab; the connection to thermal mass to help moderate internal temperature is crucial.”

Settled in

For a Sydney couple, the eco transformation of their turn-of-the-century Sydney home has been a journey they've enjoyed sharing with others.

PROJECT TYPE
Renovation

PROJECT LOCATION
Lewisham, NSW

DESIGN
Brent Reid

The rammed-earth wall provides both beauty and thermal mass.

PHOTOGRAPHY James Robertson

A WARM AND MODERN ECO EXTENSION TO JAMES AND Priscilla's hundred-year old house in Lewisham, Sydney, has provided them with a much-needed new living space and kitchen.

James and Priscilla have recently replaced the back half of their federation style free-standing house to create the new living space that looks onto a sunny back garden. They had help from a designer and worked to a budget of $250,000.

A rammed-earth wall divides the extension from the original house. James says the wall is not only the standout feature for everyone who visits, it also provides beauty and thermal mass to their home.

They enjoy spending time in the new kitchen. The low-VOC kitchen is practical and engaging and was made with untreated kauri benchtops and E0 FSC birch plywood cabinets. Another feature in the kitchen is a 'cool cupboard' that uses the heat of the fridge to draw in cool air from under the house.

"We're planning to stay for the long term in a location we love, so our sustainability steps will give us a big pay-off, in terms of reduced ongoing costs and increased liveability," says James.

He adds that they were interested in opening their doors for Sustainable House Day. "We think it's important to connect with the local community, and to show what can be achieved in a sensible renovation with a sensible budget."

The extension is just one part of their plan to improve the house. The next stage is to add solar hot water as the new extension gives them a greater amount of unshaded roof space. They also plan to install more solar PV when the current feed-in tariff expires.

James has some advice for future renovators: "Don't be afraid to take control of the design and the build; after all, you'll be the one living in it, not the architect or builder."

LINKS
lewishamhouse.wordpress.com

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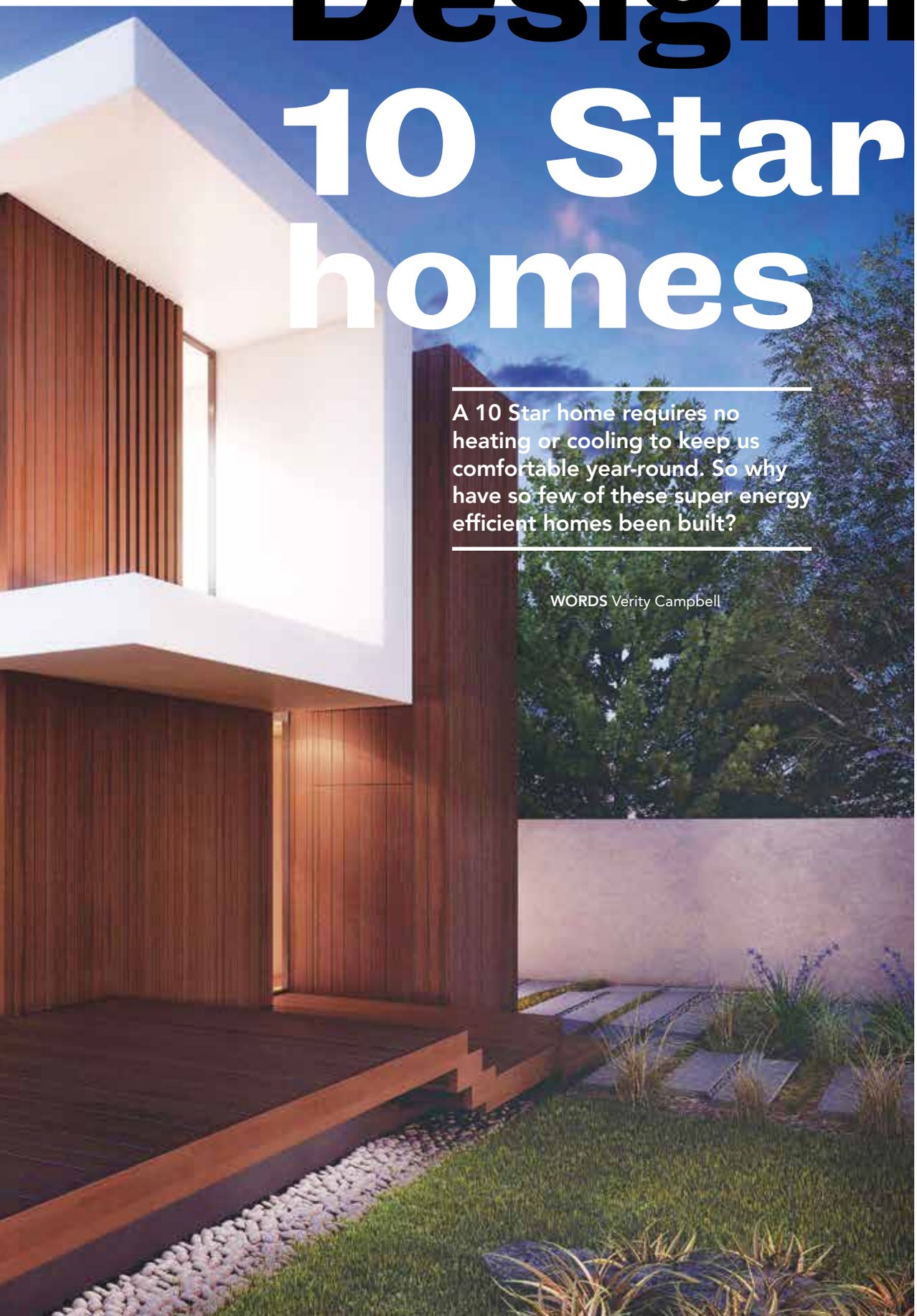
Melbourne Design Studios' winning entry into BDAV's 10-Star Challenge 2012 has a small building footprint of just 145 square metres.

Designing 10 Star homes



A 10 Star home requires no heating or cooling to keep us comfortable year-round. So why have so few of these super energy efficient homes been built?

WORDS Verity Campbell

Image: Joel Barbitta

'Josh's House' in Fremantle, WA, is being built to 10 Stars. Josh Byrne, environmental scientist and ABC *Gardening Australia* presenter, decided to use the design and build of his home to demonstrate how conventional building materials and construction methods can be used to create a 10 Star home. He also wanted to show that it is possible to build to 10 Stars with comparable costs and timeframes to conventional homes. The progress of the build is documented with fact sheets and videos at www.joshshouse.com.au

THE MORE ENERGY STARS YOUR HOME HAS, THE MORE comfortable it is, with less need for heating or cooling. A 10 Star home should need no heating or cooling whatsoever.

All new buildings in Australia have to be built to a minimum 6 Star rating. Stars are calculated using Nationwide House Energy Rating Scheme (NatHERS) software which uses computer simulation at design stage to assess the thermal performance of a home. NatHERS looks at elements such as orientation, layout, construction materials, insulation and glazing.

The Australian sustainable building guide, *Your Home*, estimates that 38 per cent of a home's energy use is for heating and cooling, so a 10 Star home should save significant greenhouse gas emissions and money on bills, year on year.

So why are so few 10 Star homes built in Australia?

Lack of knowledge in the building industry is holding back affordable high-performance solutions, says Tim Adams, principal of F2 Design and former president of the Building Designers Association of Victoria (BDAV).

Adams has been instrumental in promoting 10 Star homes in Australia. He helped launch the BDAV's 10-Star Challenge in 2011, a competition that awards the best 10 Star designs. "The idea behind the contest was to get building designers and energy raters to go through the process of designing a 10 Star house," he says. "By going through that process they gained an understanding of what's required to design to 10 Stars, and from then on designing 7 or 8 or 9 Star homes was so much easier."

Dick Clarke from building design firm Envirotecture agrees: "Striving for 10 Stars is useful as it can develop techniques and materials that will trickle down to make the broad adoption of 8-plus Stars more affordable."

But is 10 Stars economical? It can depend on where you live, says Tim Ellis from Timothy Ellis Building Design. "Having done 10 Star designs for both Victoria and northern Queensland, I have found that in general the measures required for 10 Star housing in Victoria add more to build costs. Designing for cooler climates tends to be a more expensive proposition."

But the savings can be more significant, says Trivess Moore, research fellow at RMIT's College of Design and Social Context. He says moving the discussion away from 'affordability versus sustainability' is vital. Moore's research has found that a zero emission house in Melbourne was a least-cost scenario in terms of operational energy costs across the life of the house, with a payback period of 12 to 14 years. "This reduces even further when other elements such as resale value are included in the analysis," he adds.

Adams reiterates Moore's point; understanding the basic principles of passive design is integral to achieving 8, 9 or 10 Stars economically. Designing and building energy efficient homes is about good design, not necessarily more specialised or expensive materials.

One of the problems holding back the building of higher star-rated homes, he says, is that some people in the industry think of energy efficiency as an afterthought, an add-on. "So they need high specification materials – double glazing, high R-value insulation – even to reach 6 Stars! If they had utilised passive design principles in the first place – north orientation, eaves etc – in many cases they wouldn't have needed to highly specify and add on additional expense. I would encourage home owners to insist on good passive design – superior performance – first." →

The two townhouses and two apartments of The Green Swing development in Perth all achieve high star house energy ratings. The homes have small building footprints and share generous communal spaces. Pictured right is the strawbale and reverse brick veneer townhouse. See p46 for more on The Green Swing. Image Sebastian Mrugalski

Adams set out to test how passive design principles influence the material specification requirements of a 10 Star home in his entry for the BDAV 10-Star Challenge, '10 Star House, Done Dirt Cheap'. "One of the things I wanted to do [with Done Dirt Cheap] was achieve 10 Stars in a Victorian climate with double glazing, instead of triple," says Adams. He achieved this by adding clerestory windows in the roof. "We found that it's not just energy performance, it's build-ability and size that contribute to the economy of the structure." Done Dirt Cheap is modular, modestly sized and cube-shaped – second to a sphere, it is the most energy efficient shape for a building because of the low surface area-to-volume ratio. "R-values were also quite low; so these relatively modest specifications for a 10 Star home make it much more affordable."

Philip Alviano, sustainable building advisor at the Master Builders Association of Victoria, says that once you're building to 8 Stars, the gains above that aren't huge and may not be worth the additional expense. "There are many elements of a home that aren't covered at all or well enough in the rating software, such as water heating, appliances and lighting efficiency," he says. Despite this, these elements can have a significant impact on the energy performance of a house, he adds. "You might be better spending the money on solar power and highly efficient heating and cooling, lighting and appliances. Remember, occupant behaviour also plays an important role."

A 10 Star house doesn't mean you have a sustainable home. It's only one part of the story, agrees Moore. The overall energy efficiency of a home also comes down to transport and food emissions, renewable energy and size. "We found that size matters. The smaller the home, the easier it is to achieve higher energy efficiency standards, and the lower the upfront and ongoing costs." S

F2 Design's 10-Star Challenge 2012 entry 'Done DIrt Cheap'. The adaptable house was designed with modular components based on a four metre grid to accommodate single, dual or multi-person occupation.

Shelter & stewardship

The bench is made up of derivatives of sheets of plywood designed so people can sit comfortably looking out or in. Taking their cue from local building design, architects Carol Marra and Ken Yeh oriented the building east–west and angled the walls at 22 degrees to prevent sun entering the house.

A residential dwelling in Sabah, on the island of Borneo in Malaysia, is a challenging ecological design and cultural change project.

WORDS Sarah Robertson
PHOTOGRAPHY Brett Boardman

Shelter@Rainforest sits in a remote part of tropical Sabah, Malaysia. Architects Ken Yeh and Carol Marra spent four years working on-site to develop a master plan and this prototype for a village of workers.

The forestry company who commissioned the plan is currently seeking certification through the Forest Stewardship Council. Its current obligations include replanting on average 30 wild trees for each tree that's harvested. The area has been logged about three times already, explains architect Carol. "This is not by any means a virgin area. It looks wonderful when you look at the tree canopy, but it's actually secondary growth from 50 years ago that's been logged before."

SHELTER@RAINFOREST IS PART OF A master plan. It's the prototype home for a series of new buildings for a community of workers in a logging concession in the Malaysian state of Sabah. The plan, by architects Marra + Yeh, is about much more than designing climate sensitive buildings. As architects committed to sustainable design, for Ken Yeh and Carol Marra it's also a project in ecological education and responsible living.

Shelter is located in a remote inland location five hours' drive from the state's capital, Kota Kinabalu. The local climate is highland tropical, with hot humid days and cool nights, torrential rains, and a rugged and difficult terrain. The project was commissioned by a private forestry company that controls 100,000 hectares of forest for a period of 99 years under a system of sustainable reforestation.

Forestry in Borneo remains a controversial issue, with little land area left covered by intact virgin forest. However, forestry in Malaysia is managed at the State level and Carol explains that in Sabah, the German government, through its Agency for Technical Cooperation GTZ, the UNDP and the Sabah Forestry Department established the current system of forest management (the Forest Management Unit or FMU), improving the industry's practices.

"The objective [of the FMU] is to apply ecologically and scientifically accepted forest management for Sabah's cutover forest production reserves," says Carol. The intent is to manage the reserves "in a way that mimics natural processes in order to achieve production of low volume, high quality, high value timber products".

For two architects committed to designing communities and buildings that create opportunities for more ecologically sustainable living, the project was particularly challenging but important. "Unless we are willing to stick our necks into a complex situation we cannot drive the ecological agenda, especially in places where our expertise is simply not available," says Carol. →

From the beginning, this project was about how to create a new, environmentally aware community culture that better values and makes the most of local resources. A building is just a building, says Ken, what's important is giving people the skills and knowledge to change their ways.

The existing housing for company employees was built 35 years ago and had mostly become shanty housing. Leading a team of experts, including an anthropologist, a botanist and a structural engineer, Ken and Carol borrowed from local wisdom to design new dwellings, a school and community buildings. Traditional buildings in the region are long, dormitory-style houses placed on ridges to make the most of cooling winds that run up the ridge and "explode" in the house, explains Ken. He adds that walls are inclined 22 degrees and buildings are always oriented east–west so that no direct sunlight penetrates.

Shelter is designed as two similar-sized units linked by a dog run, which connects to the verandah. All the services, including an indoor kitchen, outdoor kitchen, water tanks and battery bank for the solar PV system are grouped together.

At its core, Shelter is an exercise in zero waste. "I guess the building was a way of changing their mindset at a slow pace," says Carol, referring to the team of local workers who would build, live in and maintain the village over years to come. "They get the idea that everything has value and you don't waste it so you have to think of what you're doing with it."

Locally harvested and milled timber was used as the main building material. This was constrained to just two sizes, 100 x 50mm and 50 x 50mm, to maximise the yield of usable timber per tree and solve logistical challenges such as the necessary manual handling of all building materials. Locally made plywood was used as cladding for the walls and floors and to create a diaphragm for the building.

To keep the build process simple for the unskilled building team, the dwelling is made up of modular designs that use only full, half or quarter sheets of ply. "By being hands-on throughout the project we were able to select timber from particular sources knowing how it had been harvested and processed," says Carol.

The project involved more than clever architectural solutions. Part way through, the team built charcoal kilns to make use of the

The dwelling sits on the top of the ridge to make the most of breezes that run up it and through the house, says architect Ken. Locally made plywood was used as a cladding for the walls and floors and as a diaphragm for the dwelling. The two lightweight steel roofs are tied together with tension rods.

waste branches discarded from logging operations. Combined with human waste as a fertiliser, the charcoal nourishes the nutrient-poor soil in food gardens and excess charcoal is used in rocket stoves for cooking. Rainwater is also harvested and reused and a blackwater system feeds a biogas plant to produce methane that's piped into the kitchens as fuel. The biogas and solar panel systems were important to reduce the community's reliance on LPG and diesel that has had to be trucked into the village in the past, says Ken.

With their prototype and a few more dwellings complete after four years on the ground, has their master plan to create a more ecologically aware community been successful?

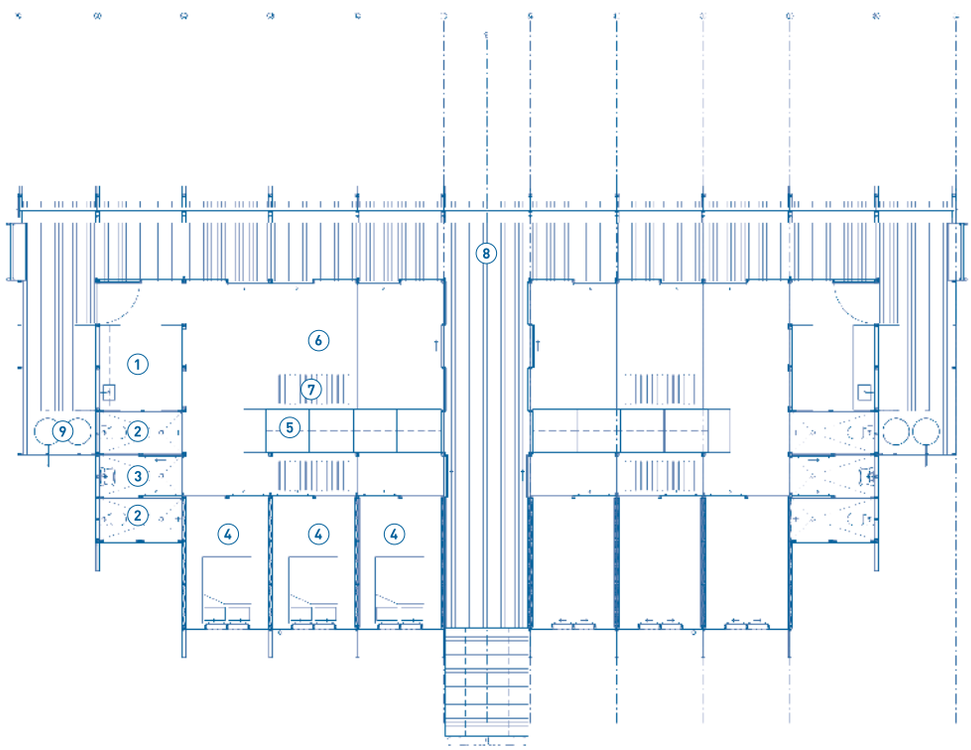
Carol and Ken are unsure when or whether all the planned buildings will be constructed but the project continues. Botanist Dr Francis Ng is working with the company and its community to encourage more sustainable food production. Locals are also being taught to identify seed-providing 'mother trees', which germinate only every seven years, to prevent them from being logged.

"You never know whether in the long term [your project is] going to work but they've definitely started," says Carol with measured optimism. "Sustainability is not something we talk about, it is something we do, not in perfect circumstances but in spite of the circumstances.

"The client was committed to following the principles we set out for the project and the proof is in the building," she says. As an example of what is possible, therefore, Shelter@Rainforest is a symbol of craft, care and environmental stewardship.

LINKS

www.undp.org.my/uploads/Forest_Mgmt_final.pdf



FLOOR PLAN

LEGEND

1. Kitchen
2. WC
3. Bathroom
4. Bedroom
5. Shelving
6. Living
7. Floor vents
8. Verandah
9. Rainwater tanks

Size does matter

WORDS Fiona Whitelaw
PHOTOGRAPHY Gerald Moscarda & Carmelina Arena

In Perth, a home's adaptable design bucks the local trend for building big.

AFTER 30 YEARS IN PERTH'S PROPERTY INDUSTRY, Marc Drexel should have found it easy to build a new house. Easy, until he realised that he didn't want a popular 'McMansion' style home.

"In Perth we live in some of the biggest homes in the world. This just means you have to spend more time working to pay for their maintenance and utilities," Marc says. "Do most people really want to live in such massive, expensive homes?"

Marc wanted a smaller home, one that was sustainable in the broadest sense. "Often sustainable building is about saving water or power, or building with low embodied energy materials, without much thought given to how different owners will actually use the house when they're living in it," he says. With a view to building a home for himself and developing a concept the property developer could promote to others, Marc decided to build a house that would suit a retired couple or a family with small children, and be wheelchair friendly.

The result is a passive solar designed house of 185 square metres with two main living areas, two bedrooms, two bathrooms, a study and a loft. "We reworked the floor plan numerous times," says Rochelle Donovan of Lucky Stripe Design, "but we both felt this layout would suit the widest range of uses."

Designing a house in which future residents could live a comfortable lifestyle without having to change the house or their energy usage was not without its challenges. The site was critical. Finding urban blocks suitable for infill development was relatively straightforward, but finding blocks with the right orientation for a passive solar design was a lot harder. Marc finally settled for a 360 square metre block in the city suburb of Wembley. →

The living area looks out onto the home's water-wise garden. Permaculture principles and water harvesting techniques, combined with native and productive food gardens are incorporated into the design. Image: Gerald Moscarda

All materials used in this Perth home went through a cradle-to-grave LCA assessment process to assess their environmental impact. Image: Gerald Moscarda

Thermal performance was key to designing a comfortable and adaptable house, especially during Perth's hot summers. A concrete slab runs the length of the northern (front) side of the house, which is which is partially protected by a solar pergola – a frame on which deciduous vines grow to shade the windows in summer and let the winter sun through in winter. Deep eaves provide further shade from the high summer sun and high-level windows let hot air escape. For additional insulation, the roof is constructed from SolarSpan, a layer of thick polystyrene sandwiched between two sheets of steel. According to Rochelle, this is the most dramatic (if often unnoticed) feature of the house. "I was standing in the loft at the top of the house directly underneath the roof on a 42-degree day, and it was still very comfortable up there without the use of mechanical cooling."

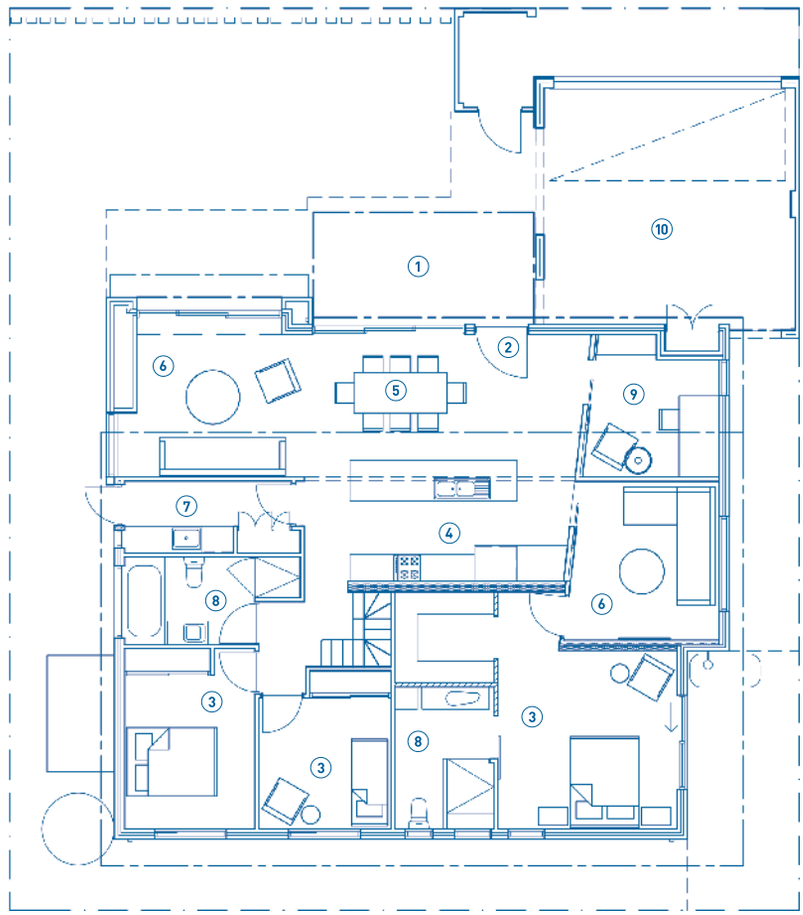
In winter a carefully placed interior masonry wall collects and radiates heat from the low winter sun, while low-e glass on all the windows limits heat escaping. The house has no additional heating or cooling, although provisions have been made to retrofit a gas fireplace should it be desired in the future. For now, Marc has installed what he calls a 'placebo heater' – a stove he retrieved from the side of the road that he says he hasn't really needed to use. Hot water is provided through a heat pump system, while a 1.5 kilowatt photovoltaic array generates solar electricity.

The house, which achieved a 9 Star home energy rating, is painted with low VOC paint and recycled materials were used in the build. Many of the building materials were life-cycle assessed (LCA) using eTool software and ARCactive, a rating tool developed by Marc's sustainability company.

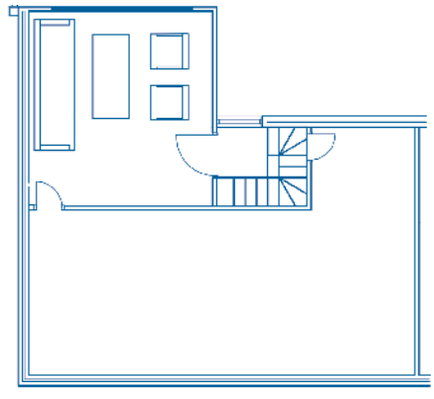
Marc and Rochelle experimented with the design of the home. A planned large water feature, which was to sit directly outside a low westerly window and act as an evaporative cooler, was abandoned due to cost. Undeterred, Marc went to a hardware store and "bought a little collection of bits and pieces and made up a smaller version". He says it works incredibly well. "You're sitting watching TV with this wonderful cool breeze coming in. It's pretty home-made but I'll definitely go ahead with the full-size version."

Marc's new home is all about maximising a small space to create a flexible, comfortable and stylish place to live now and into the future.

GROUND FLOOR PLAN



LOFT FLOOR PLAN



LEGEND

1. Porch
2. Entry
3. Bedroom
4. Kitchen
5. Dining
6. Living
7. Laundry
8. Bathroom
9. Study
10. Carport

Wembley house
—Specifications

Credits

DESIGN
Rochelle Donavan,
Lucky Stripe Design

BUILDER
Swell Homes

PROJECT TYPE
New build

PROJECT LOCATION
Wembley, WA

COST
$450,000 (incl. prof. fees)

SIZE
Approx 185 sqm

BUILDING STAR RATING
9 Stars

Sustainable Features

HOT WATER
– Stiebel Eltron electric heat pump. The small amount of energy required to drive the heat pump's compressor and fan will be supplied by solar PV cells.

WATER SAVING
– Plumbing fixtures throughout have an average of WELS 4 star.
– A 3000L rainwater tank is plumbed to supply rainwater to the bathroom and laundry
– A water-wise garden surrounds the house.

PASSIVE DESIGN
– Polished concrete slab in kitchen, living, dining and study is tinted black to increase its capacity as a heat sink
– Power-operated highlight windows in the kitchen act as thermal chimney and are easy to open and close
– The masonry wall acts as a heat sink and transfers heat to bedrooms behind
– Reverse brick veneer wall on the exposed western face of home
– Extensive use of insulation in all walls and ceilings.

ACTIVE HEATING & COOLING
– Ceiling fans help with cooling and heating.

BUILDING MATERIALS
– All materials went through a cradle-to-grave LCA assessment this includes their production, transport costs, local content, longevity, the ability to be recycled, and more
– All bench tops and cabinets made from Paperock.
– Recycled timbers used for floorboards, front door, feature front fence, gates and garage door
– All other timbers, including SHADOWclad exterior wall cladding and eaves, are FSC.
– Excess SHADOWclad used to construct cabinetry
– FSC ECOply used in kitchen
– Bondor SolarSpan roofing/ ceiling/insulation panel provides additional insulation and reduced waste on-site.

WINDOWS & GLAZING
– All windows use low-emissivity (low-e) glass designed to keep heat in. Big eaves protect windows from summer sun
– All bedroom windows have security flyscreens so they can left open.

LIGHTING
– LED lighting used throughout.

PAINTS, FINISHES & FLOOR COVERINGS
– All paints and sealants specified as low VOC
– Cabinetwork substrates rated E0 throughout.

LANDSCAPING
– Groundwater irrigates vegetable gardens, located on the front verge for community access
– A small pond beneath a low west-facing window naturally cools the living room.

OTHER ESD FEATURES
– Wet bathrooms mean there is no need for shower screens
– Energy efficient master switches installed to collectively switch off appliances when not in use
– Waste management and recycling during construction was provided by Earthcare
– The house has been carbon offset though Carbon Neutral.
– Designed for universal access
– Flexible, multi-use spaces to accommodate changing family needs
– Pergola to the north for a deciduous grape vine.

Sun shines through high-level north-facing windows onto an internal masonry wall and polished concrete floor that act as thermal mass heat sinks. This masonry wall transfers heat into the bedrooms behind it. The windows also act as a thermal chimney, venting hot air in summer. Image: Carmelina Arena

The ATA

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

The ATA, publisher of *Sanctuary* magazine, is a not-for-profit organisation working to ensure its members and the wider community have access to the resources and practical information they need to green their homes and lifestyles.

ATA NEWS

C3 WEBSITE

The Community Climate Chest or 'C3' gives households and businesses access to cheap, tax-deductible GreenPower and carbon offsets online, while directing a share of the proceeds to local environmental groups, such as the Alternative Technology Association (ATA).
www.climatechest.org.au/host/ata

EAST TIMOR SOLAR LIGHTING PROJECT

ATA volunteers have just returned from East Timor where they installed cheap, green solar lighting systems and provided training to local technicians. On this trip they installed solar systems in two schools, two community centres and 180 households. For more information on ATA's work in East Timor go to
www.ata.org.au/ipg

POLICY NEWS

The ATA has recently focused its advocacy work on the Tasmanian government's feed-in tariff and move towards energy retail contestability, the review by the Australian Energy Market Commission on distribution reliability outcomes and standards, and the implementation by the Australian Energy Market Operator of a demand response mechanism in the wholesale electricity market.

ATA SHOP

SOLAR ELECTRICITY E-BOOKLET

The ATA has recently updated its Solar Electricity Booklet to help you plan your solar system. It's now available on the ATA webshop as an ebooklet and includes information on solar panels, system components, siting considerations, system sizing and feed-in tariffs.
Price: $5, shop.ata.org.au

SMART METER CONSUMER GUIDE

With smart meters appearing across Australia, the ATA's new booklet provides guidance to help householders take advantage of the new products and services associated with smart meters. The guide can be downloaded for free from the ATA website.
www.ata.org.au

BACK ISSUES

Australia's greener bathrooms, kitchens, natural ventilation, thermal mass, greener paints, LED lighting – *Sanctuary* covers it all. Go back to the basics with back issues.
Price: $7.95 print; $5.95 PDF – ATA members can access all back issues online, free of charge.
shop.ata.org.au

Speed Date a Sustainability Expert

When: **10am, Saturday 24 August 2013**
Where: **Marion Cultural Centre, Diagonal Road, Marion**
Why: **Sustainable Speed dating is part of the Marion Learning Festival 23-26 August**

Are you renovating or building? Thinking about solar power or hot water? Redesigning your garden, and wanting to do it sustainably? Get a head start! Come and meet green architects and experts on energy efficient products, permaculture, greywater and more at the City of Marion's Speed Date a Sustainability Expert event.

Seminar and Q&A sessions on sustainability topics will be followed by Speed Dating: your chance for a short 13-minute 'date' to discuss your plans and ideas directly with the experts. Register online to meet knowledgeable people that have made green design and technology a core part of their businesses.

Speed Date a Sustainability Expert is a free event. For more information and to register for your 'dates', visit **sdsd.ata.org.au**. No booking required for the seminar.

SDSE Adelaide is a free event held by the City of Marion in conjunction with the Alternative Technology Association (ATA).

ATA

CITY OF MARION

marion.sa.gov.au

facebook.com/CityofMarion twitter.com/CityofMarion youtube.com/CityofMarion

Get your sun shades on

WORDS

Anna Cumming

In most climates, appropriate sun shading is as important to successful passive solar design as orientation and window placement. Anna Cumming looks at how to keep the sun out when it's not wanted.

NORTH-FACING WINDOWS, GOOD ventilation and thermal mass to help regulate the internal temperature of our homes: the basics of passive solar home design are pretty straightforward. Shading for sun control is no exception. Well-designed shading lets the sun's warmth into your house in winter, and keeps it out in summer. Something as simple as an eave or a vine-covered pergola can block up to 90 per cent of the heat generated by direct sun, reducing the need for active cooling, cutting energy consumption and making a home more liveable and more sustainable.

When direct sunlight hits a window, radiant heat passes through the glass and is absorbed by walls, floors and furnishings. This heat is then re-radiated back inside the room, heating it: a desirable outcome in winter but one to be avoided in summer. Blocking the sun before it reaches the glass is the most effective way to control this unwanted heat gain.

If you are building from scratch, you have the opportunity to design shading systems in conjunction with carefully considered window size and placement. But even if you are retrofitting an existing home, shading can help mitigate problems like too much solar heat gain through west-facing windows.

WHAT SHADING WHERE? CONSIDER YOUR CLIMATE

When thinking about shading, your geographical location and climate are important factors to consider.

In temperate climates the magic direction to start with is north, says ATA technical expert Mick Harris. "The north side of a home has the most solar energy available and it is the easiest to control. All you need is the right width eave or other horizontal shading to stop the sun in summer and let it inside in winter." [Ed note: *Your Home* provides a simple formula for calculating eave widths.]

For east and west windows, a different shading solution is needed as the sun is lower in the sky. Architect Emma Scragg recommends adjustable vertically-placed blinds, screens or louvres. "They work best to control sun for the short time it's needed, and then open up again to daylight, views and breezes," she says.

In hotter climates – roughly north of Brisbane – shading is important all year round, including on the south side of your home. In colder parts of the country, winter heat gain is the priority so it's vital to ensure any shading doesn't impede solar access in winter.

Local site topography also plays a part in deciding the amount of shading needed, explains architect Graham Anderson. "For example, a south sloping site may need slightly less shading for a longer period of the year." [Ed note: For more information, see *Your Home*'s 'Shading' fact sheet.] →

A pergola framework shades the long northern side of this coastal home in Victoria by Sunpower Design. The wires along the pergola will help deciduous plants and vines grow to shade the home in summer and leave the windows open to sunlight in winter. Image Judy Sederof

The Evo Awnings Range from Luxaflex can span five metres and is available with both motorised and open roller mechanisms.

EXPERT TOP TIPS

- When designing shading, along with considering sun angles, be aware of the appropriate slope for rainwater runoff and flashing. If it's done incorrectly it may lead to water penetration. - *Sue Connor, Archisoul*
- Opt for adjustable shading that offers control depending on circumstances and daily weather, even if it means going for cheap options like match-stick blinds as a temporary measure until you can afford longer term options. - *Graham Anderson, Graham Anderson Architects*
- Design shading to keep summer sun outside the house and as far away from the walls as possible. In addition to heat gain through windows, direct sun heats up walls and reduces the lifespan of your paintwork. - *Stephanie Skyring, Skyring Architects*
- Avoid dark-coloured external awning blinds fitted close to the glass as they will get hot and re-radiate heat into your home. - *Lyn Beinat, EcoMaster*
- While interior shading options are generally easier and more cost effective to install (particularly in an existing building), they are not as effective at reducing solar heat gain, so the cost savings are generally lost in the long term. - *Jessica Nixon, Okologi*

These Duette shades (left) by Luxaflex are made from 40 per cent recycled materials. Far left: Luxaflex Newstyle Polyresin shutters.

SHADING OPTIONS

There are plenty of choices for effective shading, from cost-effective and easily retrofitted blinds to custom-designed automated systems. External shutters and screens can also provide security while inner doors and windows are open for ventilation.

Mick Harris' mantra is to tackle the easy things first. "Correctly designed eaves are simple and cheap," he says. With no moving parts, eaves and fixed awnings and screens are simple and easy to maintain. They can be made from a range of materials from fibre cement sheet to Colorbond, aluminium and timber.

Brisbane architect Stephanie Skyring favours fixed awnings for windows in the sub-tropics and tropics: "They are cost effective and allow you to keep the windows open when it's raining." However, they allow for less active sun control and flexibility than adjustable versions. For western and eastern facades where the sun is intense at a low angle for a short time she recommends retractable fabric awnings. Other adjustable shading options include blinds, louvres, sliding screens and roller shutters. Louvres, shutters and even pergolas with adjustable angled blades allow sun control while admitting breezes.

Emma Scragg is a proponent of trees and plants as shading. "A living sunshade is the most eco-friendly shading available," she says. "Evergreen trees and vines are ideal in areas where year-round sun shading is desirable. Carefully chosen deciduous screen plants and overhanging trees provide summer shade and winter sun." Lyn Beinat of energy efficiency consulting company EcoMaster agrees. "A pergola with deciduous vines is a functional thing of beauty."

If the budget stretches, pergolas with motorised blinds or complete louvre roof systems such as Vergola may fit the bill. Archisoul director Sue Connor notes that such systems can help create the effect of an outdoor room and allow your home's internal spaces to feel larger.

However, sometimes external shading is not a viable option. As Scragg explains, it tends to be more expensive, access for installation and operation may be difficult, and internal sun controls can be much easier, especially if you are a tenant. "Internal blinds and curtains are easy to operate, can double as thermal insulation to keep warmth in and are not subjected to as much weathering as external options." For more effective interior sun control, choose a blind with a metallised back to reflect sunlight coming through the window.

CHOOSING YOUR MATERIAL

External shading devices are of necessity exposed to harsh sun and weather. When choosing a material, durability and maintenance requirements need to be balanced with embodied energy, carbon emissions and recyclability.

Australian company Sonnenschutz favours aluminium for its 'Rollosette' external venetian blinds. "While aluminium has a high carbon footprint, it weathers very well – even uncoated – in most environments, and it's very efficient to recycle," says director Bryce Hedditch. He also makes an important point about colour. "The hotter most coatings and fabrics get, the quicker they degrade and fail. Reflective, light-coloured surfaces are excellent for reducing transmitted heat and keeping the shutter or blind cooler so coatings last longer."

For fixed treatments, FSC-certified or – even better – recycled timber can be an excellent choice. Repainting every 10 to 15 years will extend the life of the shade device [Ed note: see *Sanctuary* 23 for ideas on environmentally friendly exterior paints].

When it comes to fabric, direct exposure to UV radiation causes natural materials such as canvas to deteriorate, giving them a limited lifespan when used as sun shading. For better durability, PVC (polyvinyl chloride) coatings are commonly used to provide UV resistance and increase the lifespan of the product. However, flexible or plasticised PVC can off-gas volatile organic compounds (VOCs), including phthalates. If you choose to avoid or limit your use of external shading fabrics containing flexible PVC, your options are limited. You could choose a product such as Sunbrella Renaissance Unity fabrics which contain 50 per cent post-industrial recycled fibre and no PVC. Alternatively, you could use a product with recycled PVC content. Australian blind manufacturer Helioscreen runs a recycling program for the Texyloop PVC-coated polyester Helio 86 and Helio 93 fabric used in its products. →

Carefully chosen deciduous screen plants and overhanging trees can provide summer shade and winter sun, such as the vine that grows over the southwest, west and northwest faces of this Brisbane home, Trellis House, by Aardvarc architects.

TO ASSESS A PARTICULAR SHADING SYSTEM, ARCHITECT EMMA SCRAGG SUGGESTS USING THE FOLLOWING CHECKLIST:

- What sort of sun shading is needed? Adjustable? Fixed? Do you need access to breezes while the shading is being used?
- What is the expected life of the product? What is the warranty? Can the components be recycled or reused at the end of the product's life?
- Does it have working parts? If so, are these easy to maintain and repair?
- Can you operate and adjust the shading easily to obtain the maximum benefit from your investment?
- Does the system work smoothly with the operation of openable windows, doors, internal window dressings, insect screening and security features?
- If automated or motorised, can the system be operated during a blackout?

Emma Scragg Architecture: www.emmascragg.com

TO AUTOMATE OR NOT?

These days there are plenty of options available for motorising and automating your blinds – individually with a timer or a sun sensor, or as part of a more extensive 'smart home' automation system. Designer Jessica Nixon of Okologi notes that automation can increase the efficiency of your exterior shading, particularly if the house is empty during the day. Graham Anderson agrees, but cautions that an easy override should be built into the system for when more active human control is required. On the other hand, automation is an added complication and expense, and as *Your Home* succinctly states, "operating automated systems uses energy, so they will only lead to energy savings if they save more energy than they use".

While some form of motorisation might be necessary for shading on skylights and hard-to-reach windows, remember to consider the benefits of keeping things simple and being actively involved in managing your home. Sue Connor describes this as "working the sails... knowing your own home and where the winds and sun come from", and adjusting accordingly for the most comfortable, efficient home possible.

LINKS & RESOURCES

Your Home 'Shading' fact sheet: www.yourhome.gov.au
EcoSpecifier Eco Priority Guide: 'External Shading Devices' www.ecospecifier.com.au

Speed Date a Sustainability Expert

'Speed Date a Sustainability Expert' is heading to Adelaide in August. Here's a list of the sustainable design and living experts involved.

South Australia's leading green home designers and experts will provide free advice to the public at Speed Date a Sustainability Expert, in the City of Marion on August 24.

Speed Date a Sustainability Expert Adelaide is the fourth in a series of events from *Sanctuary*'s publisher the Alternative Technology Association (ATA), linking homeowners to Australia's leading sustainable design and living experts around the country.

After successful 'Speed Date a Sustainable Designer' events in Melbourne, Brisbane and Sydney, the Adelaide event will help householders whether they are renovating or building a new home sustainably, or simply seeking advice on solar power, energy efficient products, permaculture or greywater.

At the Adelaide event, seminars and Q&A sessions on sustainability topics will be followed by Speed Dating – 13-minute 'dates' where people will be able to talk about their plans and ideas directly with the experts. The event is being held by the City of Marion in conjunction with the ATA as part of the Marion Learning Festival.

Here, we've provided a directory of the sustainability experts involved in the Adelaide event. If you're looking for an expert in another state, check out the *Sanctuary* Sustainable Design Directory for experts in your area.

www.sanctuarymagazine.org.au/sustainable-design-directory

SDSE Adelaide

WHEN: Saturday 24 August 2013
WHERE: Marion Cultural Centre, 287 Diagonal Rd, Oaklands Park

For more information and to register, visit sdsd.ata.org.au/adelaide

SDSE ADELAIDE IS A FREE EVENT HELD BY THE CITY OF MARION IN CONJUNCTION WITH THE ALTERNATIVE TECHNOLOGY ASSOCIATION (ATA).

ATA

CITY OF MARION marion.sa.gov.au

facebook.com/CityofMarion twitter.com/CityofMarion youtube.com/CityofMarion

Sustainable designer directory – Adelaide

ALTERNATIVE DESIGN STUDIO

Alternative Design Studio is a small architectural design firm specialising in boutique house additions and new homes. Their aim is to produce beautiful, sustainable and innovative designs that are also functional and cost-effective. They believe that great design and respect for the environment go hand in hand – design features that help to make a house sustainable are the very same features that make a house beautiful, inspiring and comfortable.

www.alternativedesignstudio.com.au

PAUL DOWNTON ARCHITECT

Paul Downton has been designing ecological architecture for more than 40 years. His clients are as diverse as his architecture, which ranges from tiny city houses to multi-dwelling projects to substantial university campus buildings. He also consults on eco-city planning projects in China, and is one of the primary authors for *Your Home*. He says: "I don't do tick-the-box sustainability because it's important for each project to be a unique response to its client and its place."

www.pauldownton.org, www.ecopolis.com.au

TS4 ARCHITECTURE

TS4 Architecture are passionate about designing affordable, climatically responsive and comfortable homes. Specialists in zero energy and zero carbon homes, TS4 Architecture combines creative and technical knowledge from the disciplines of architecture and industrial design to generate solutions that are practical, buildable, within the clients' budget and have architectural merit.

www.ts4.com.au

NIGEL MILLER ARCHITECT

Nigel Miller is a sole practitioner who is passionate about architecture, design, environmental issues and providing a professional service to clients. His practice was founded after 20 years of diverse architectural experience and focuses on sustainable design for houses and small-scale commercial projects. Nigel is committed to environmentally responsible design, incorporating natural textures and recycled materials, natural lighting and ventilation.

www.architect.net.au/nigelmillerarchitect

ECO HABITAT DESIGN

Ian Dolman developed his architectural knowledge and experience working with Adelaide's senior architects on projects covering a range of domestic and commercial buildings throughout SA. Ten years ago he set up his own practice to further develop his passion for and knowledge of sustainable design. Ian enjoys the collaborative design process with his clients and the exchange of ideas that ensures each project delivers a sustainable home that aligns perfectly with his clients' lifestyle.

www.ecohabitatdesign.com.au

SALT STUDIO ARCHITECTURE

Salt seeks to provide integrated solutions through efficient, optimised, appropriate and sustainable architecture, to enhance the immediate environment and help ensure its integrity and balance into the future. The firm believes that built projects should be used as key forums for the development of environmentally sustainable design, improved working environments and appropriate and meaningful design solutions.

www.saltstudio.com.au

Sustainable designer directory – Adelaide

BOHDAN DORNIAK & CO ARCHITECTS & TOWN PLANNERS

We are a small firm of architects with a passion for designing sustainable buildings. The firm has expertise in design, documentation and contract administration of all projects. Design principles include solar passive design, low-embodied energy materials including straw bale (over 50 completed projects), earth and reverse brick veneer.

www.bdcoarchitects.com.au

TROPPO ARCHITECTS

Troppo aims to promote a sense of place through dynamic architecture that responds to both the climate and the local setting using adjustable skins that connect the indoors with the outdoors. Troppo is committed to the notion of environmentally sustainable and responsible architecture, which leads to a whole-of-site approach (and beyond).

www.troppo.com.au

EMILIS PRELGAUSKAS ARCHITECT

Thirty years ago Emilis built his carbon-neutral home office at Monarto, which is his practice's base to this day. Since then he has helped numerous clients build climate-appropriate, low energy, low water and low waste buildings integrating best-practice passive and low-resource systems – earth tubes, subsidence towers, reed beds and so on. He is widely published in technical and homeowner books and manuals.

www.emilis.sa.on.net

PASSIVHAUS AUSTRALIA

Passivhaus Australia combines sustainable design with building biology principles to create dream homes or commercial project. They offer solutions balancing environmental, social and financial objectives to work towards a toxin-free and carbon-neutral future. Their buildings are financially and ecologically sustainable, are practical to live in, beautiful to look at and built to last for generations.

www.passivhausaustralia.com.au

JULIAN RUTT, SUSTAINABLE ARCHITECTURE

With an interest in residential and small-commercial projects, Julian's approach to sustainable architecture focuses on reducing our impact on the world's resources and increasing our awareness of and connection to our external environment. Julian is able to help building users minimise their use of water and energy after handover. He was named South Australia's Emerging Architect in 2009.

GOODHOUSE

Goodhouse is a systemised design and construction approach that delivers architecturally designed, highly efficient and sustainable homes at an attainable price. These homes respond to the client brief, integrate with the environment and provide healthy and connected spaces in which to live.

www.goodhouse.co

FIND SUSTAINABLE DESIGNERS ONLINE AT

sdsd.ata.org.au/adelaide &
www.sanctuarymagazine.org.au/sustainable-design-directory

Sustainable expert directory – Adelaide

Rainwater harvesting & greywater

STEVE ECKERT, ECO BUILDING SUPPLIES
Established in 2008, Eco Building Supplies provides expert advice and service on rainwater harvesting, greywater and underfloor heating. Founder Steve Eckert has taught at the Plumbing Industry Association of SA and worked in Papua New Guinea to help supply villages with clean water.
www.ecobuildingsupplies.com.au

Energy efficient products

STEPHEN JENKINS, GREEN BY DESIGN
With more than 35 years' experience living in rural and urban environments utilising on-grid and off-grid solar power, solar hot water and rainwater solutions, Stephen specialises in renewable energy and sustainable retrofit advice...His projects suit a variety of climate zones and client budgets.
www.greenbydesign.net.au

Solar PV and hot water

FINN PEACOCK, SOLARQUOTES.COM.AU
Finn is a Chartered Electrical Engineer who has designed control systems for nuclear power stations and worked within CSIRO's renewable energy division. He established SolarQuotes.com.au, a website that provides a broad range of independently-sourced information about solar PV systems.
www.solarquotes.com.au

Solar PV and hot water

NAT ELLIOTT, KEYSTONES SOLAR GROUP
Nat completed his Certificate in Renewable Energy in 2006 and worked for several solar companies before joining Keystones Solar Group two years ago. He is passionate about solar power, solar hot water and passive solar buildings and incorporated all three into his own house renovations.
www.keystones.com.au

Permaculture & sustainable garden design

DAVID (HARRY) HARRISON
Harry's expertise includes building productivity via biodiversity with minimal intervention and creating microclimates that suit plant growth and integrate with the built environment He can advise on how to design a garden to enhance the thermal aspects of living, utilising microclimates and recycling organic matter.

Sustainable building materials

NILS GRUTTNER, CV CONSTRUCTIONS
CV Constructions aim to convert plans and ideas into sustainable and highly energy efficient homes. They focus on sustainable construction methods and materials and aim to make homes more affordable and available, thereby slowly changing current industry practices.
www.cvconstructions.com.au

Energy efficient lighting

STEPHEN PATRICK, LED ECO LIGHTING
Stephen has been involved in the lighting industry for more than 24 years, seven of them with LED Eco Lighting specialising in energy efficient lighting for domestic, commercial and industrial applications. He can advise you on the specific lighting required for your particular lighting needs.
www.ledecolighting.com.au

Sustainable builder

ENERGY ASPECT LIVING
Discover practical design and construction solutions to make living in your new or existing home more comfortable and affordable. Energy Aspect Living build energy efficient, sustainable, and zero carbon building. Danny Pauley and Donna Bartsch can answer questions on material selection, general building and design.
www.energyaspectliving.com.au

FOR MORE INFORMATION
and to register visit sdsd.ata.org.au/adelaide Online registrations for Adelaide's Speed Date a Sustainability Expert are essential. No bookings are required to attend the seminars.
sdsd.ata.org.au/adelaide

Image courtesy Finn Peacock, solarquotes.com.au

Go team green

The student team behind Australia's first Solar Decathlon entry have retrofitted an Australian fibro house with a garden to encourage recycling, reuse and food production.

WORDS Beth Askham
PHOTOGRAPHY Rui Yan

THE TEAM BEHIND WOLLONGONG University's 2013 Solar Decathlon China entry have just emailed me from a high-speed train. They've sent through the list of plants that surround the house they are speeding to rebuild in Datong, China. Here it will be judged against other homes designed by university students around the world. The house is Australia's first entry in an international Solar Decathlon competition, and they call it the Illawarra Flame.

THE HOUSE

There is great satisfaction in seeing something reach its full potential. The Illawarra Flame is a cleverly crafted house and the product of a lot of hard work and vision by a group of dedicated students. Designed as a retrofit of a fibro house on a standard suburban block, the team behind it have pushed the possibilities of sustainable housing technology.

The retrofit includes a series of pre-manufactured pods that can be added to an existing fibro house, bringing the entire cost of the home to around $250,000. To show that retrofits are possible for people with varying budgets, the team has broken down its concept into three stages. Stage one includes the most cost-effective changes, such as insulation and solar hot water. Stage two includes upgrades such as the addition of solar PV, high efficiency glazing and thermal mass. Stage three is a complete retrofit, including adding a phase change material heating and cooling system.

In China the house will be judged against criteria such as energy efficiency, energy production, comfort and appeal. After the competition it will return to the university to become a living laboratory where researchers will test its performance and calculate payback times for each part of the renovation.

LANDSCAPING

The Illawarra Flame's garden design is an important element of the home's sustainability ethos. Beginning at the edges of the balcony, the landscaping uses recycled timber and other materials and includes a composting system, wall gardens, reed bed filtration and an aquaponics system.

Compost bins have been brought out from their usual dark corner of the yard and placed in garden beds extending from the main living balcony. Environmental engineering student Chris Nicholson from the landscape team says they made the bins accessible to encourage household composting. The bins are porous and sit entirely below the garden's surface, allowing moisture, worms and other microbes to move through them. "This really reduces the maintenance of the composting system," says Chris. He adds that they have lids and produce no unpleasant smells if they're properly maintained. The composts also provide organic matter to a vegetable garden close to the house.

In six square metres at the back of the house, reeds sit in a gravel bed. The reed beds filter greywater from the shower and laundry to be reused for toilet flushing and clothes washing. As the greywater flows into the bed, a bacterial biofilm on the gravel converts the ammonia in detergents into free nitrogen. This nitrogen is then taken up by the reeds for growth. The water then seeps through a slow sand filter and is stored in a tank for later use.

The aquaponics system sits near the house and is integrated into the garden. After six weeks, the system is fully established and includes an 8000-litre fish pond with about four square metres of open-air hydroponic growing space. The system works by running fish tank waste water that is high in nitrogen over growing plants in a hydroponic growing bed. A functioning system should produce both tasty fish and greens.

Chris says a similar system he built at a friend's place last summer is doing well. They added 20 jade perch to the tank. Omnivorous and fast-growing Australian fish, jade perch eat fish food but they also eat worm-farm worms, lettuce and soft vegetables. Chris's fish started out small but now, a few months later, they are the size of a human hand. In 12 to 15 months the perch should be ready to eat.

A hydroponic garden attached to the fish tank is accessible from the back balcony or from ground level. Leafy greens seem to do best in this system as they require lots of nitrogen to grow. You can also grow tomatoes, herbs and capsicums (just to name a few). "It's unbelievable how fast they grow," says Chris. "It's at least double or triple the speed of growing them in soil as they have a constant water supply."

In the rest of the garden, plants were chosen for their look and water usage and include the Illawarra flame tree, Kings Park bottlebrush and weeping tea tree. Other native plants include big red kangaroo paw, little john bottlebrush, white correa, Gymea lily, royal mantle grevillea, spiny-headed mat-rush, tanika mat-rush, tussock grass, native rosemary and elite lilly pilly.

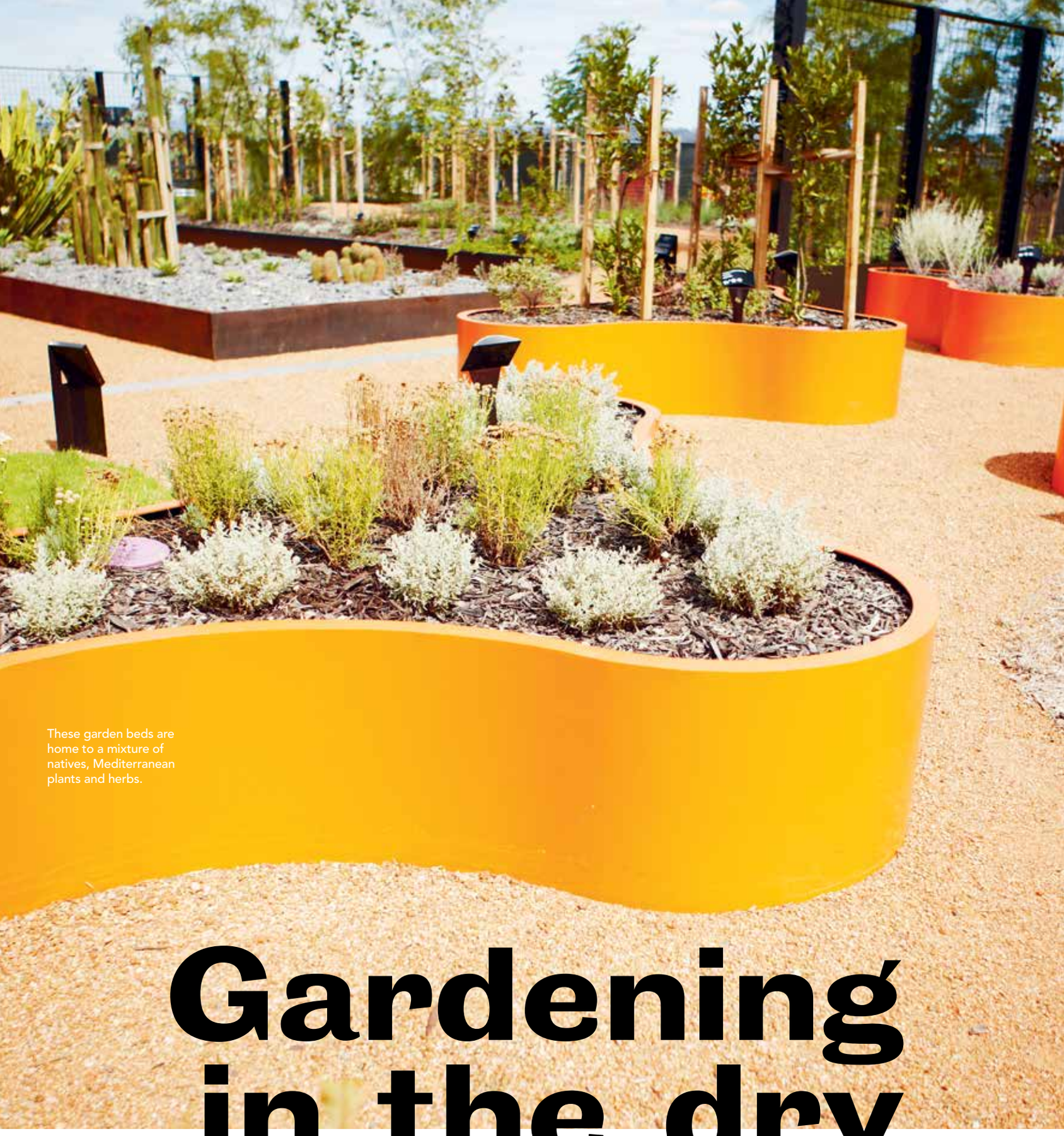
The Illawarra Flame's open day at the University of Wollongong earlier this year allowed visitors to learn about the garden systems. The garden's plant species were chosen because they are endemic to the Illawarra region in southern NSW and will provide habitat for local birds and animals. They also have low water and maintenance requirements.

These low-maintenance vertical balcony gardens are easily accessed by the home's occupants. The shaded garden under the awning is growing ornamentals, while the garden in the sun is for herbs and small greens. The planter boxes are made from recycled timber and use a cascading water system to drip water down from the top level.

THE TEAM'S GARDEN VISION

The landscape has been designed to capitalise on outdoor space by creating usable outdoor 'rooms'. Inspired by four natural elements – sun, water, wind and earth – these rooms focus on different uses and purposes while reflecting the natural environment. The solar lounge includes seating opportunities with a sheltered northerly aspect to enjoy the sun. The water lounge is bordered by an aquaponics system, reed bed and rainwater harvesting that serve as an aesthetic visual display of water and its uses. The wind room uses planting and sculptural features to expose the movement of wind in the landscape. The earth room includes circulation space through mounded ground profiles and large rocks displaying strength, stability and form.

The garden has been designed to fit on a small suburban block. These compost bins are set into the garden bed off the main living balcony.



These garden beds are home to a mixture of natives, Mediterranean plants and herbs.

Gardening in the dry

Successful water-wise gardens are about common sense and taking stock of what grows locally.

WORDS Beth Askham

SEVEN RIVERS FLOW INTO THE ACT, WINDING through the grasslands and woodlands around Canberra. The Cotter Dam catches some of this water and keeps it, along with three other major dams, for Canberrans to quench their thirst and water their gardens. Water will never abound in the relatively dry ACT so designing gardens to be water-wise makes sense as you are working with what you have.

A showcase garden commissioned by the government-owned ACTEW Water called the Canberra Discovery Garden has been created to inspire and educate people about gardening with minimal water use.

Matt Friend works in community engagement and education at ACTEW Water and was involved in the garden through its design and build stages. He says one of the company's priorities is to encourage Canberra residents to use less water in their gardens, as this is the single biggest usage of water in the ACT. He adds that it's an easier task than getting everyone to take shorter showers.

A community group of horticulturists, passionate public and industry representatives worked on the garden's design. The group decided what plants and features were important to include and what plants people would like to see.

Tracy Bool is a horticulturist who was part of the group. She says the garden is an opportunity to teach and inspire. Since it opened she has been running workshops on pruning, composting and getting ready for the growing season. The garden is about "getting people excited and being thoughtful about gardening, planting and using a lot of what you already have in your back garden – keeping it local", she says. →

Much of the garden is raised and on wheels to allow for flexibility in the use of space and to provide accessible garden space for those with reduced mobility. All images courtesy ACTEW Water

CREATING A DRY LANDSCAPE GARDEN

- Design and plan your garden
- Know your soil
- Select appropriate plants
- Be practical with the amount of lawn you have
- Use water only as required and water wisely, focussing on the roots of the plant and not the leaves
- Mulch your garden
- Carry out maintenance such as pruning, weeding, adding mulch and nutrients to the soil and keeping any irrigation in good shape
- Water deeply less often rather than frequent shallow watering.

The garden is divided into three spaces. The first is an area to meet and learn and includes a deck and some rotating, experimental garden beds. The middle space is where people can see what plants can grow in a water-wise garden. The last showcases different turf grasses and includes three warm season and three cool season grasses.

Within the garden is a mix of exotic and native plants that are integrated well, she explains. "There is a misconception that you can grow one or the other, but they can complement each other."

Of all the plants in the garden, Matt says the crowd favourite is *Acacia cognata*, with cultivars 'Limelight' and 'Mini Cog'. It's a soft-leaf weeping acacia not typically planted in Canberra but it's been very successful in the garden. Tracy particularly loves the unusual smokey blue-grey foliage of the *Banksia blechnifolia* ground cover, as well as the *Veronica perfoliata* or 'Digger's speedwell'.

But Matt says his favourite plant growing in the garden is the *Xanthorrhoea*, or grass tree. It came from a site at Cotter Dam that is soon to be flooded to increase the dam's capacity. Around 200 grass trees have been relocated around Canberra from the dam site, and one of these has been planted at the gardens. So far it has settled in well and even produced a flowering spike three days after it arrived.

A lot of the garden's plants grow in raised beds on wheels. "We wanted to show people that you could have a garden in a space that isn't very suitable for a garden, like a balcony," says Matt. These beds are also raised to a certain height so people with reduced mobility can access the gardens. The whole garden is built for wheelchair access. Ⓢ

LINKS:

Canberra Discovery Garden: http://bit.ly/NmVDIk

Since they have been planted the gardens have been growing well, even though they're planted on an exposed site at the new Canberra Arboretum.

Sustainability assessments for healthy homes

WORDS

Danielle King

Danielle King discusses how and when a home sustainability assessment can help you improve the environmental performance of your home.

Common unsustainable practices:

- Energy and water waste through lack of knowledge
- Beer fridges in the garage left on with nothing or very little in them
- Lack of draught proofing and insulation in the home
- Heat loss/gain through unprotected single-glazed windows
- Heating/cooling running when not really needed (and at inappropriate temperatures)
- Food waste and disposal of organic waste products into landfill
- 'Special' waste such as batteries, chemicals, and other toxic items being put into general rubbish bins

THREE OR FOUR YEARS AGO THERE seemed to be thousands of home sustainability assessors (HSAs) around the country, of varying degrees of knowledge and competence. However, the implosion of the federal government's Green Loans program has meant that the majority of work has all but disappeared. Today only really passionate and dedicated assessors are still working in this useful and often undervalued field.

First let's look at the types of services home sustainability assessors can provide and how these can benefit householders. HSA services range from general assessments through to detailed energy, water and waste audits. Some assessors also offer other services such as building or renovation plan reviews and sustainable material options for projects.

THE HOME SUSTAINABILITY ASSESSMENT

Sustainability assessments are extremely helpful when people want to not only reduce their energy costs, but also better understand their overall environmental impact.

Most assessors focus on Home Sustainability Assessments. This is a holistic review of a household that takes into account energy and water usage, waste, gardens and lifestyle attributes. This involves significant engagement with the householder to cover all aspects of a sustainable home, including practical actions to reduce the overall environmental footprint of a home and its occupants.

These assessments generally take two to three hours as the assessor looks around the home, asking a variety of questions and giving information to the householder. After a home visit, the assessor often spends a further two to five hours on analysis, identifying appropriate solutions and writing up their recommendations. The end report includes a summary of the household's current situation, detailed information on what was found and recommendations to improve the home's environmental footprint. The report should also contain an easy-to-follow checklist that the homeowner can use to follow through on actions. Supplementary information should include rough costs, where any recommended products could be sourced from and an indication of savings if the recommendations are applied.

There are a variety of different 'levels' of sustainability assessment, however. In addition to the 'full monty' described above, assessors can also provide quick assessments to help householders identify what they could be doing to be more sustainable and energy efficient. The cost of an assessment varies depending on the size of the home being assessed and the type of assessment being done. A quick assessment costs about $140, while a full review can cost up to about $900.

HOME ENERGY AUDITS

In the past six months there has been growing demand for home energy audits. These audits involve a similar process to a home sustainability assessment, except that the assessor focuses in on a household's energy bills. The assessor reviews the bills and the home, takes measurements (where possible) and/or makes calculations to quantify how much energy appliances are using.

An energy audit performed to current AS/NZ standards should identify 80 per cent (this is soon to change to 90 per cent) of energy usage in a home and the home's main energy guzzlers. For example, if a household's daily usage is 20kWh, an assessor should identify the appliances using 18kWh of that total, the rest is generally due to appliances in standby mode. →

Image: Rhiannon Slatter

Recommendations are provided on how to reduce energy usage, with solutions to help householders determine the cost-effectiveness of their actions. Comments on energy rates and supply charges are also made available so householders can better understand their energy usage compared to others.

Energy audits are proving a great benefit to those who feel their energy bills are getting out of control, want to identify what appliances and gadgets are contributing the most to their energy usage, and want to know what they can do about it. Generally speaking, energy audits can identify ways to reduce household energy bills by between 15 per cent and 60 per cent, depending on the home and the behaviour of the occupants.

FINDING AN ASSESSOR

Properly qualified and accredited home sustainability assessors can provide excellent independent advice and guidance to help a household reduce energy and water costs while minimising its environmental footprint. The national qualification requirement is currently a Certificate IV in Home Sustainability Assessment. Accreditation is available to suitably qualified persons through the Building Designers Association of Victoria (BDAV).

LINKS

BDAV accredited HSAs: www.bdav.org.au

Danielle King is an accredited sustainability assessor and director of Green Moves Australia www.greenmoves.com.au She sits on the BDAV's Sustainability Advisory Board and teaches sustainable building topics part-time.

Designers rise to the challenge with 10 Star homes

Super efficient, liveable and environmentally responsible homes rise again to the 2013 10 Star Challenge.

THE BUILDING DESIGNERS ASSOCIATION of Victoria's (BDAV) 10-Star Challenge encourages designers to design super energy efficient homes that require no heating or cooling to be comfortable to live in all year.

The challenge aims to boost awareness of the benefits of good sustainable design and improve the capability of building designers to build affordable and efficient homes.

Maxa Design, F2 Design in collaboration with Phoebe Clarke, and MichSquared Design in collaboration with Emma Schmutzer and Faith Tek were finalists in the single dwelling category. All submitted designs that achieved more than the mandatory 10 Star house energy rating. They went further to show holistic approaches to sustainable design that envisages homes for a more sustainable lifestyle.

MichSquared Design took out the single dwelling category award for their considered approach to the challenge and their well-articulated design. As well as achieving a 10 Star rating, the design incorporated sustainable site management, sustainable material selection and water sensitive urban design.

Armsby Architecture and last year's single dwelling category winner Melbourne Design Studios were the two finalists in the multi-dwelling category. Melbourne Design Studios took out the category award with their multi-residential infill housing development in Richmond. The judges commented that the proposed 10 Star town houses illustrate a holistic approach to sustainable design.

BDAV president Michael O'Sullivan said the 10-Star Challenge encourages designers to think outside the square.

"The 10-Star Challenge allows building designers to showcase their expertise in eco-friendly design, at a time when Australians are paying more attention to energy use in their homes," added challenge ambassador and television personality James O'Loghlin.

Sanctuary's editor Sarah Robertson was privileged to take part as a judge in this year's 10-Star Challenge. "It's no easy feat to design a 10 Star home. The entries in this year's challenge show that homes can be energy efficient, environmentally sustainable, very well designed, and they can be designed on modest budgets," she said. →

Melbourne Design Studio's design for a 10 Star urban infill multi-residential development.

Single dwelling finalists

MICHSQUARED DESIGN
in collaboration with Emma Schmutzer and Fatih Tek

JUDGES COMMENTS
MichSquared Design's 'Eco-10 Concept' is a detailed, ecologically sensitive and well-articulated entry, illustrating their considered and holistic approach to ecologically sustainable home design. A broad range of ESD initiatives were considered in the detailed submission. Materials were selected for their sustainability and recyclability, and post-construction recycling and waste management initiatives considered and specified.

F2 DESIGN
in collaboration with Phoebe Clarke

JUDGES COMMENTS
F2 Design's 'Edible House' is a commendable example of a holistic approach to sustainable design. Its excellent proportions and organic form result in a home that responds appropriately, yet treads lightly on the Melbourne environment. The judges noted the design's careful consideration of sustainable, including recyclable and locally-sourced, materials and the inclusion of renewable technologies and water sensitive design.

MAXA DESIGN

JUDGES COMMENTS
Maxa Design's 'Aussie All Stars' home is notable for its attention to form, function and environmental sustainability, no matter what its location. The judges commended the firm's presentation of a home that can achieve 10 Stars in all capital cities, with only modest modifications and allowing for varied client taste. The small building footprint of this prefabricated and geometrically defined home is functional and liveable.

Products

01

HARRY AND HARRIET

Harry and Harriet, a collaboration between artists Alana McVeigh and Dale Frances, is a Fremantle-based company that make functional porcelain objects. Our favourites are their coloured porcelain cups moulded from take-away paper cups rescued from rubbish bins. The connection to a discarded paper cup gives them a sense of a past life as well as an appreciation of this incarnation's longevity. Harry and Harriet's range of objects are produced with minimal environmental impact and incorporate recycling and solar-powered electric firing.

www.harryandharrietaustralia.com.au

02

PAPEROCK

Paperock is a composite laminate material made from layer upon layer of paper, some of which is recycled. The paper is compressed and cured with synthetic resin to become a strong building material. It is hard-wearing, water and stain resistant and emits no VOCs. It can be cut into any shape and sanded down to turn its internal colour layers into design features.

paperock.com.au

03

ECO INNOVATORS DESIGN CARDS

Explore design solutions for environmental problems in a card game. When playing with these design cards, players develop products and are challenged, inspired and informed to make sustainable decisions. The deck contains 50 cards divided into three groups; design problems, design strategies and design inspiration. You can buy the cards directly from the Eco Innovators website or download them for free. Instructions on how to play are also on the website.
www.ecoinnovators.com.au

04

MUD MAT FROM USETHINGS

The clever people at usethings have made a handmade mud mat that removes mud and dirt from your boots as you walk into the house. It's made from plantation sugar gum dowel off-cuts that would normally go to waste. The mat can cope with the flex and moisture of outside life and copper boat nails fix the dowels in place, adding to the durability and weather resistance of this lovely product. Price: $145
www.usethings.com.au

05

SUNBRELLA RENAISSANCE UNITY FABRICS

These awning and shade fabrics are made from 50 per cent post-industrial recycled fibre. The colours in the range are designed to coordinate with a variety of exteriors and trim materials. They have a vintage appearance but have the fade resistance and sun protection qualities of a modern fabric.

www.sunbrella.com

06

BAMBOO PLY FLOORING FROM STYLE PLANTATION

Style Plantation's strip bamboo flooring is UV resistant, non-toxic and has very low VOC and formaldehyde emissions. It's prefinished with polyurethane and is strand-woven and laminated. Made from 95 per cent bamboo, this flooring is suitable as a non-structural overlay for residential or commercial floors. Costs range from $50 to $68 per square metre.

www.styleplantation.com.au

Ask our experts

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

Lance

John

Lance Turner is the Alternative Technology Association's (ATA) technical editor and writes for *Sanctuary*'s sister magazine, *ReNew*. John Knox is an energy efficiency advocate, technical specialist and web shop manager at ATA.

Q—

We have a low ceiling with cathedral style lining and want to know the best way to light this room – we would rather not use downlights. - Julia

A—

John – Good on you for not taking the 'easy' way out. As a result, you will save heaps on your heating and cooling bills. Everywhere you place a downlight you need to remove insulation which can lead to a 'Swiss-cheese' effect where you have holes in your insulation, reducing its ability to limit heat flow.

Since you have a low ceiling, it will probably be difficult to use a standard pendant light. Another option is to use an adjustable angle batten holder. This allows you to mount the holder on the angled ceiling yet have the bulb pointing downwards – and no Swiss-cheese! You can then take advantage of standard bayonet bulbs for your lighting needs, including the increasingly available and incredibly energy efficient LED varieties. You can even fit a variety of lampshades on these to spruce them up.

Q—

Our hot water system just broke and we are looking for an energy efficient replacement. Do you have any recommendations? It gets quite a lot of use and we have no solar access. - Don

A—

Lance – With no solar access, you can't use a solar water heater as they need long hours of direct sunlight to be effective.

The next most efficient option would be a high quality heat pump system such as the Sanden heat pump, which uses CO_2 as a refrigerant and has a rated coefficient of performance of around 4, meaning it uses only a quarter of the electricity to heat the water that an electric water heater using resistive elements would use.

Another alternative is an instantaneous water heater as it will supply unlimited hot water – ideal where hot water use is heavy. There are a number of high efficiency units available including models from Rinnai, Bosch and Aquamax, among others. Just select the unit with the appropriate flow rating, bearing in mind that these types of heaters also have a minimum flow rating that they need before they will switch on.

Bear in mind that for situations where hot water is used in short bursts, an instantaneous unit may not be the best option as they are less efficient under such use and there is excessive wear and tear on their valves and control flow switches. In that case, I would go with a heat pump system as it has a storage system.

Visit the ATA's forums at www.ata.org.au/forums for questions and answers on everything green.

If you've got a question you'd like answered on this page, email Ask our experts at sanctuary@ata.org.au

We've found the experts to help build your sustainable home

www.sanctuarymagazine.org.au/sustainable-design-directory

Images: Nick Stephenson

Sustainable architects, designers, and professional product and service providers are listed online in *Sanctuary*'s **Sustainable Design and Living Directory**.

Sanctuary is Australia's premier magazine dedicated to sustainable home design.

AN ATA PUBLICATION

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