MODERN GREEN HOMES

Sanctuary

INSIDE ISSUE 36 Urban off-grid; six light-filled renos; self-reliance in retirement; recycled timber; picking a site with potential; green home ideas & products; smart tech and more

SUSTAINABLE HOUSE DAY SPECIAL

PLUS Tips for greening your courtyard & balcony

INSIDE

Six stunning 'back room' renovations

9.4 Star home on the coast

Should I quit the grid?

ISSUE 36 • SPRING 2016
AUD$11.95 • NZ$12.95
SANCTUARYMAGAZINE.ORG.AU
ISSN 1833-1416
9 771833 141000

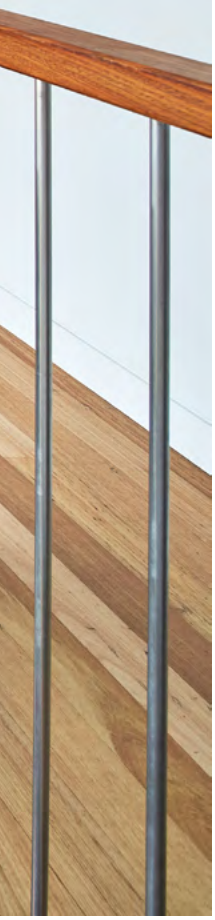
WIN

A Daikin US7 super efficient 7-star rated reverse-cycle air conditioner

Offer open to Australian and New Zealand residents only, details p61

Beyond brilliant

A narrow, dark, cold Northcote terrace gets a light, bright rethink, connecting it to the world beyond and allowing a young family to stay in their close-knit community.



WORDS Anna Cumming
PHOTOGRAPHY Peter Bennetts

Planter boxes, louvres and folding glazed doors all help soften the distinction between inside and outside, letting the family connect with their surroundings. 'Haiku' bamboo ceiling fans from Big Ass Fans help keep the home cool.

IT'S A DULL GREY LATE AUTUMN morning in Melbourne, but at Tim and Karen's dining table it's quite bright enough to work without switching on the lights – remarkable, considering that it's downstairs at the south end of their very narrow 'train carriage' Northcote home. On a block that's only 5.9 metres wide, facing the street to the north and adjoining a double-height neighbour to the east, the renovation of their 1920s weatherboard cottage into a light-filled, thermally comfortable and flexible living space was not straightforward, but they have achieved it in spades.

"The old place kept the rain out, but didn't feel comfortable to be in," Tim says. "It didn't breathe, and it was so dark and cold." They also needed more space to accommodate their growing son and Tim's home-based business. The couple considered selling and buying somewhere bigger but strong ties to their local community, and a great location that allows them to live without a car, convinced them to stay and renovate instead.

They found architect Ben Callery through a mutual friend, and engaged him to deliver them "flexibility, light and air." Ben's design retains the original home's two front rooms, as dictated by the street's heritage overlay; behind, the rest of the house was demolished and replaced with a clean-lined, boxy two-storey extension. When adding to a heritage home, "I think it's important to make the new clearly different from the old," says Ben. Downstairs, there's a new bathroom and

Hempcrete house

Building with hemp is still a novelty in Australia, but interest continues to grow. This house in inner-Sydney is built using hempcrete for its low embodied energy and excellent acoustic and thermal performance.

WORDS Sasha Shtargot
PHOTOGRAPHY Lena Barridge

WHEN SIMON AND HOLLY DECIDED to renovate the back of their home in Sydney's Marrickville to create a better living space for themselves and their two young children, they knew there would be challenges.

Being on one side of a semi-detached house would mean thorough negotiations with neighbours; there were also the issues of the sloping block and complying with acoustic requirements due to the overhead aircraft flight path.

But the couple opted for more than just a regular build with bare essentials – they decided on a bold sustainable design using hempcrete as the main building material for a new, passive solar two-storey addition within the existing footprint of the home.

Tracy Graham, director of Connected Design, was hired for the project, with Nick Sowden doing the building.

At ground level, the existing kitchen, laundry, bathroom and playroom were demolished and a new bathroom and laundry and new kitchen and dining area built. The new upper floor consists of a main bedroom, study and shared bathroom.

With the aim of creating a greater sense of space, usability and connection to the backyard, the overall result is a generous house that provides three bedrooms, a study, two bathrooms, laundry, kitchen and dining area and outdoor space on a 197.5-square-metre site. The upper floor of the addition is a modest 35 square metres.

Tracy says consideration of neighbours was important, with the floor in the new space lowered and the bathroom and laundry ceiling heights designed low to ensure the upper level did not adversely affect the neighbours' privacy and solar access.

Hempcrete was used in the addition's external walls and in the roof as insulation, with magnesium oxide board as the ceiling board. It was originally suggested by Nick for its thermal and acoustic performance as well as breathability.

"It does take a bit of thought on how to get services into the walls and everything must be placed correctly before you start installing the hemp mix, but it is a pleasure to work with," Nick says.

"Having a better performing house

New concrete slab on a northern aspect with shading and large double-glazed stacker doors combine to create the room's passive heating and cooling system.

From the front, the double storey extension is barely visible. The front of the house had a terrible issue with condensation and mould, which has been improved with a subfloor fan by Xchange air and subfloor insulation.

A hempcrete walling system was chosen for its highly insulative properties and consists of hemp, sand, lime and a 'secret' binding agent. An acoustic rating of Rw 47 (the weighted sound reduction level) was required due the house's location on a flight path – the 125mm of hempcrete insulation yields Rw values in the mid 50s.

A collective effort

With a new rammed earth wall and concrete slab in the extension, this classic Melbourne weatherboard now achieves 6.8 Stars and has gained a new lease on life.

The inclusion of the rammed earth wall and concrete slab in this otherwise light-weight construction was key to this 80-year-old house achieving its high energy star rating. The wall is significant for beauty, texture and thermal mass: "It's a talking feature of the house." As is the kitchen which is built from re-milled floorboards salvaged from the demolition and hand-crafted by owner and furniture maker Nathan Whitcher.

WORDS Verity Campbell
PHOTOGRAPHY Michael Burnside

LIFE IS GOOD IN THIS SUNNY FAMILY home in Melbourne's inner north, but it took a while to get there. After purchasing a large north-facing block with a classic bungalow that had weathered a number of renovations, it was five years before Pam, Nathan and their two children decided what to do with it. Their budget was relatively tight, their scope broad, and they wanted to be hands-on through the process – the right person willing and able to work within those constraints was elusive.

Through a friend they met Eugene Byrne from Byrne Building Projects. Both building designer and certified Green Living Builder, Eugene committed to working with them on the brief to create a thermally comfortable, light and bright home – on budget.

Eugene and his team set to work on the back of the home, with Nathan at the front. Nathan started by installing wall and ceiling insulation; sourced, cut and replaced the floorboards in the study; and oiled the ceiling in the living area, all the windows and doors, and the exposed timber cladding outside. The existing leaky and aluminium-framed windows were replaced with timber double-glazed units, helping to bring the entire house – existing and renovated – up to 6.8 Stars. "This was one of the bigger expenses," explains Pam, "but we're so pleased to have done it."

The couple advises would-be renovators to finish as much as possible while the building is underway. "We really regret not getting the shed, the driveway, and the landscaping done at the same time, rather than let it all drag on," says Pam.

Meanwhile, in the back of the home Eugene was transforming the inward-looking functions of the home into an expansive open plan kitchen, living and dining room designed to passive design principles with a robust, low-maintenance material palette.

Eugene's grand design gesture for the home is the tapered eave sweeping skyward, opening this new part of the home to the sun-drenched garden and northern sun. High-level hopper windows ensure heat is vented and fresh air moves throughout. For thermal gain a rammed earth wall lines the southern wall. "It's a talking feature of the house," explains Pam. "I think the thermal mass properties of the rammed earth wall and the concrete floor is just amazing. In summer you can walk into the back area of the house and it feels like an air-conditioned environment, and in winter we rarely have to turn on the heating. We've saved probably 30 to 40 per cent on our energy bills just in the first seasons we've been here."

Another talking point is Nathan's custom-designed and built kitchen. Made from salvaged joists, bearers, and studs from the renovation, Nathan has built a

Should I quit the grid?

WORDS

Andrew Reddaway

Andrew is an energy policy analyst and adviser at the ATA, *Sanctuary's* publisher. He is the creator of the Sunulator, a free online tool which estimates the economic feasibility of a solar-battery system.

Debate abounds on whether going off-grid is the 'greenest' response for those households wanting to reduce their environmental impact and reduce energy bills. Andrew Reddaway steps through the multiple ways households are connected to the grid, and explains what's involved with cutting ties.

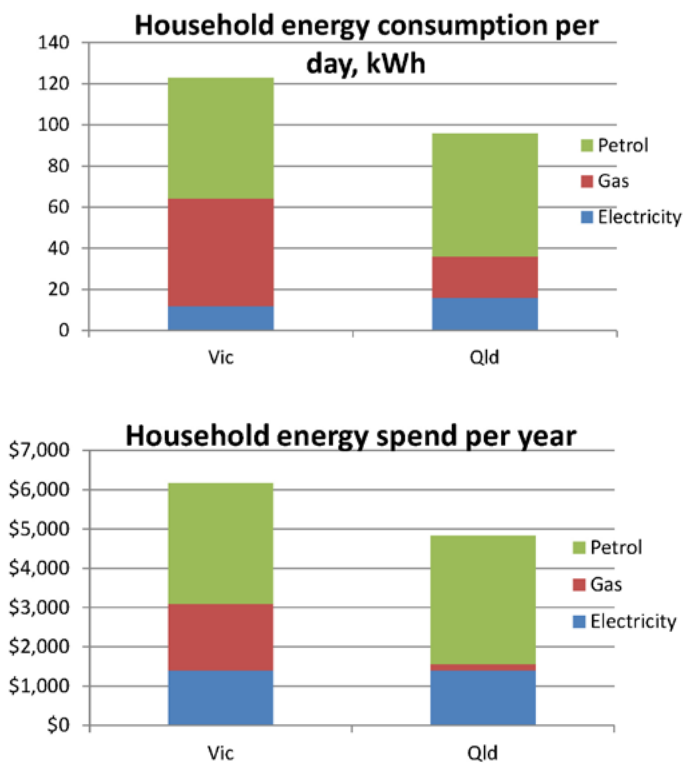
Going off-grid certainly has its attractions – self-sufficiency and no more bills! While many of us think mostly of electricity when planning on quitting the grid there are in fact three energy 'grids' most Australian households rely on in their day to day lives, including the electricity grid, gas network (piped gas and bottled gas), and petrol stations.

Disconnecting your home from all three grids is possible, but it's challenging and may require a large up-front investment. Quitting one or two is a lot easier and can still provide quite a high level of self-sufficiency.

OFF-GRID VERSUS GRID-CONNECTED SOLAR SYSTEMS

More than 16 per cent of Aussie homes have solar electricity. [1] Recently installed solar systems tend to be quite large, around 4 kilowatts (kW) or 16 panels. Such a system's annual generation exceeds many households' annual electricity consumption. Can't these people simply mount a battery on the garage wall and sever their electricity connection? One hurdle is that normal grid-connected solar systems are quite simple – they rely on connection to a big, stable electricity grid. Without the grid, they can't cope with the fluctuations of appliances turning on and off. A bigger problem is that they can't generate enough electricity on a cloudy day.

Adding a small battery to a grid-connected solar system has some benefits (discussed later), but it won't generally enable you to go off-grid. This kind of system retains a grid connection, and is referred to as a 'hybrid' solar system.



These charts show indicative energy consumption and spend on each energy grid, for Victoria and Queensland. Source: ABS and previous ATA modelling work.

SIZING AN OFF-GRID SOLAR SYSTEM

The real challenge is getting through a cloudy week. Let's consider a family in Sydney with a moderately low electricity consumption of 10 kilowatt-hours (kWh) per day (you can find your daily energy consumption or 'usage' on your bill). We'll assume they're installing an off-grid solar system using industry-standard lead-acid batteries. As a rough indication, they would need 10kW of solar (30–40 panels) and batteries with a rated energy storage capacity of 65kWh, weighing nearly two tonnes. After adding robust, smart components required to deal with fluctuations, the total installed cost would be around $55,000. A smaller or cheaper system could be installed instead, but this would probably involve some compromises such as a shorter lifespan, lower level of reliability, lower electricity consumption during cloudy weeks, and/or greater use of a generator.

The required system size varies with how much sunlight your location receives, and how much electricity you consume per day.

GENERATORS

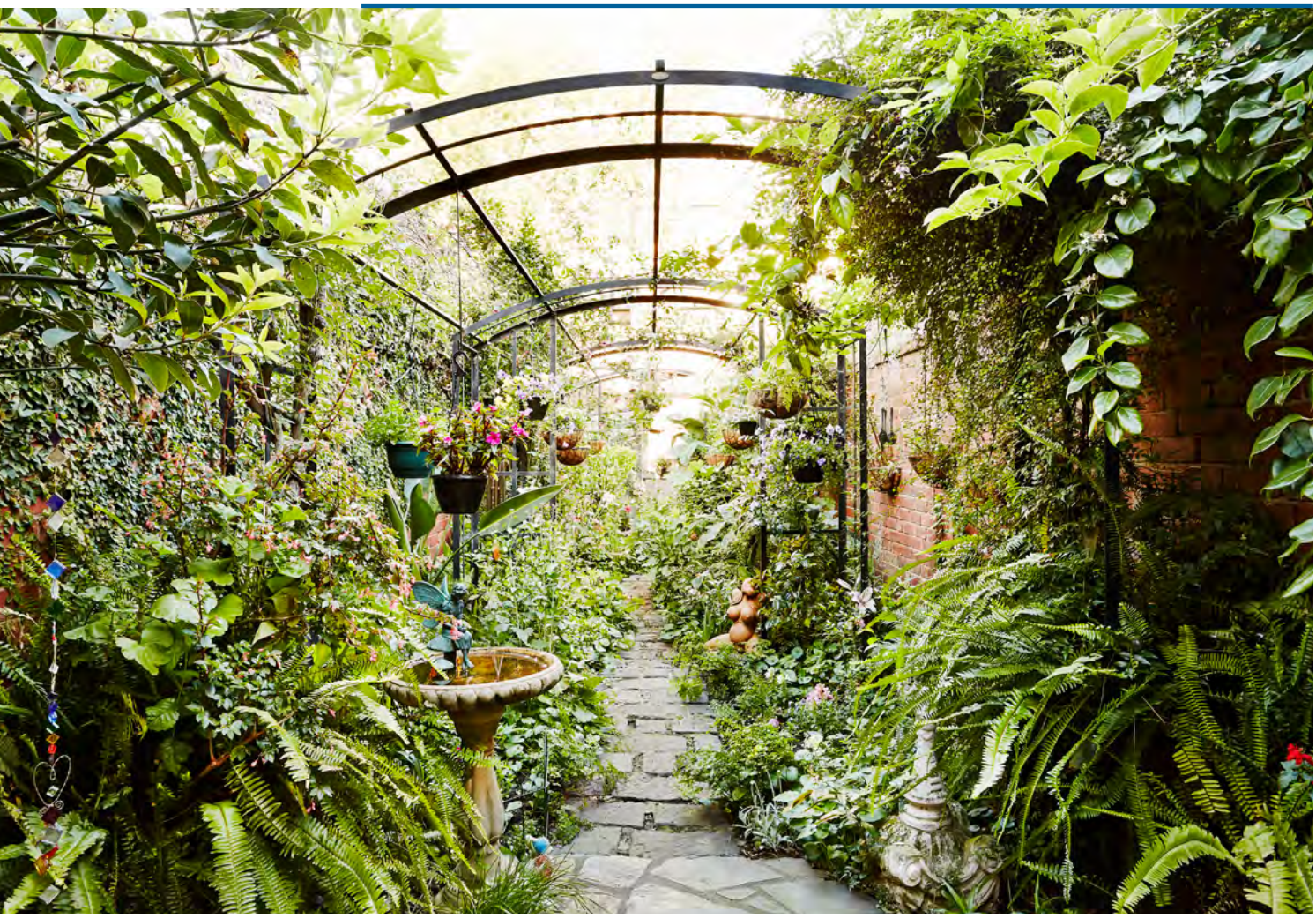
An off-grid solar system like that described earlier can cope with a moderately cloudy week, but not an exceptionally dark one such as during the east coast flooding in June 2016. Many solar owners reported that their panels generated negligible electricity at this time. People living off-grid normally rely on a petrol or diesel generator to deal with such events, as well as during periods when guests are visiting and using extra electricity, or when sunlight is blocked by bushfire smoke, for example.

Diesel generators are preferred over petrol for reliability, safety and fuel economy. A good off-grid solar system can start up the generator when required (as long as it has an auto-start feature). Larger generators don't have to run for so long, and fumes and noise need to be accommodated. A generator with all these features might cost around $7000. Generators are by far the most expensive way to produce electricity, so runtime should be minimised. →

Kerry Dawborn decided to go off-grid in Cockatoo, Victoria, despite previously living with a grid-interactive solar system with battery backup. Her current system is a 2kW solar + battery system, including 10 x 200W panels, nickel-iron battery, Victron MPPT charge controller and Selectronic 24 volt 3.5kW SP 240 inverter. It is enough for her needs, but she may later choose to install a backup generator. Kerry's motivation to go off-grid was to reduce impact on the environment and achieve energy self-reliance. The passive solar designed home is small and efficient and designed to reduce energy demand, but she still needs to be mindful of energy use: "I have had low power a few times, but this wasn't so much a hardship as just something to adapt to. I welcome the opportunity to be creative in how I manage, and it makes me appreciate having full power at other times."

Small spaces gardening

Higher density living affects outdoor spaces as well as our homes – but small in size doesn't have to mean short on greenery. Kate Smalley from Small Spaces Garden Design explains how to make the most of courtyards, balconies and vertical spaces.



Courtyard: Anne Atkins' Fitzroy courtyard garden is a riot of greenery, with hanging pots, creepers, trees and shrubbery combining to create depth and height. Image: Annette O'Brien

Edible courtyard: In courtyards, garden beds tend to be narrow or sheltered so the rain does not always reach these spots. This edible garden is irrigated, full of herbs and vegies and provides enough space for chickens. New soil is created from compost in bins located beneath a long timber-grille platform. The raised garden beds have enough depth of soil to support small trees and vegetables. Image: Sydney Organic Gardens

WORDS Kate Smalley

INCREASINGLY, OUR GARDENS ARE becoming smaller spaces, whether that means a compact back garden, a courtyard or a balcony. But this doesn't mean you can't have abundant greenery. A small garden can be a little oasis in the midst of our urban sprawl. You can create your own microclimate and cool your space, even grow some trees. You just need to think on a smaller scale – you might not be able to have a 20-metre lemon-scented gum in your courtyard garden, but maybe you can plant a grafted variety. Look for grafted corymbia or eucaplytus, or other small tree cultivars, like the crepe myrtle 'zuni'.

The principles of garden design are essentially the same for small or large gardens. However, in a small space there is nowhere to hide, so all the components need to work well. Part of having a sustainable small garden is getting it right the first time: you don't want to have to reinvent the whole thing in 12 months because what you put in the first time didn't work.

START WITH THE FUNDAMENTALS

SOIL

A vital ingredient of any garden is the soil. For courtyards and small backyards, my driving principle is to work with the soil that's there already.

Clients often ask me to remove the existing soil and replace it with new. I usually resist this and prefer to build on what's there; unless it's clearly in really bad shape – full of builder's rubble or contaminated from paint or concrete runoff.

If you have a really sandy soil, add compost and other organic matter and over time this will build up the soil. At the opposite end of the scale, if it's a heavy clay, then add gypsum.

You should also use plants that 'like' your soil type. For a sandy soil, choose plants that suit a coastal environment; options include westringia, leucaphyta, melaleuca, anigozanthos (kangaroo paw). Look to Western Australian natives for some inspiration. With clay soils, select plants that like poor drainage such as callistemons and bottle brushes. Lomandra grasses will also cope well – they're tough and will cope with almost anything!

One of the most important things for any soil is to add compost. Compost will increase the organic matter in the soil – it's food for your soil. You can buy compost by the bag or make your own. Even a small courtyard or balcony can host a worm farm or Bokashi bucket on the kitchen bench which will reduce your landfill load and feed the soil at the same time.

A big part of any small garden is likely to be pots. Use potting mix rather than soil in pots. Pots need good drainage and potting mix is designed to deliver air and water to the roots. Remember, you get what you pay for. You've already invested in pots, planters and plants, so don't cut short on the potting mix. Use the one that is right for your plants and check if it has fertiliser added to the mix; this can sometimes explain a difference in cost. If it doesn't include fertiliser, then add a pelletised slow-release fertiliser to your pots at the time of planting. Don't add organic matter to potting mix as this will actually disrupt drainage and air flow; pots are an artificial environment, so the usual rules don't necessarily apply.

Specialised potting mixes are particularly beneficial when planting specific groups of plants. If you are growing succulents then use a succulent mix as it has a more open structure than regular potting mix and is good for both succulents and orchids. The same goes for specialised vegie or native potting mixes; they've been designed to cater to the specific requirements of those plants. A good all-round, all-purpose potting mix is ideal for small potted trees, citrus or other fruit trees.

→