

MODERN GREEN HOMES Sanctuary

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An upcycled house; Winter heating options; How to choose your architect

LIVING, KITCHEN + BATHROOM

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ISSUE 27 • WINTER 2014
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ISSN 1833-1416



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Winter escapes
Hydronic heating
Choosing your architect

MODERN GREEN HOMES Sanctuary

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ROYAL DUTCH
Gazelle



A delightful addition

A new addition makes a small Northcote cottage light, warm, functional and cosy.

WORDS Sarah Robertson

PHOTOGRAPHY Neil Prieto

IF EVER THERE WAS A HOMELY HOME TO MAKE YOU FEEL comfortable, cosy and happy, it might just be this one in the Melbourne suburb of Northcote. The renovated house, home to designer Emily Wright of accessories label Nancybird and her partner and ecologist Robert, marries an impeccable and eclectic interior aesthetic with a keen sense of environmental stewardship.

Emily and Robert commissioned architect Olivia van Dijk to redesign the weatherboard house, giving the façade a fresh coat of paint but focusing on bringing much more warmth and light into the south-facing living and kitchen areas.


Together they decided on a single-storey extension incorporating living, kitchen and dining areas, as well as a new bathroom and laundry. It was Olivia's job to design it to be highly functional, light-filled and based on passive solar design principles. Emily and Rob wanted an addition that didn't mimic the original cottage but complemented it in materials, scale and presence.

"The extension needed to open up to the south to build a strong connection between the new living space and the garden, so one of the challenges was to bring northern light into the home in an interesting way," explains Olivia. Her design opens the living room

to the north through a courtyard and angled roofline with clerestory windows. "I'm really happy with how the project has worked out ... it feels spacious and open but still has a lovely sense of intimacy, warmth and craftsmanship," she says.

Emily commissioned furniture designer Damien Wright of Wright Studios to craft the kitchen Olivia had designed. He used local and recycled timbers, including yellow stringybark for the cabinetry and recycled mountain ash. The benchtop was made from hardy stainless steel.

Rob and Emily went over their budget, with the design and build costing about \$340,000, including design fees and unexpected costs. "Our budget was initially much lower than this, but to do justice to the design we decided to go for better materials, such as a more bespoke kitchen using handmade hardwood veneers instead of ply. We also needed to do things like restump the existing house which added quite a bit of associated costs."

Emily and Rob are thrilled with their revitalised cottage. "The light, the sense of scale and proportion are great," says Emily. "I also love the way in which the back room blends with the outdoors." 



The south-facing rear of the semi-detached Northcote home looks out onto a water-efficient rain garden designed and landscaped by homeowner Rob with indigenous semi-aquatic plants and recycled pavers.



"We love the functionality of the kitchen; the space works easily with us both in there," homeowner Emily says of the kitchen designed by architect Olivia van Dijk and fitted out with recycled timbers by furniture designer Damien Wright.





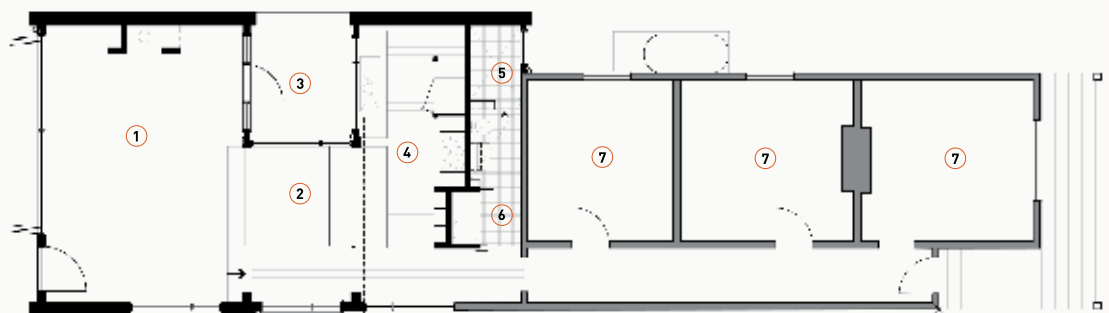
The windows overlooking the garden to the south are raised to enable better use of the living space. Double glazing and a better insulated building fabric mean less noise seeps in from outside.



LEGEND

FLOOR PLAN

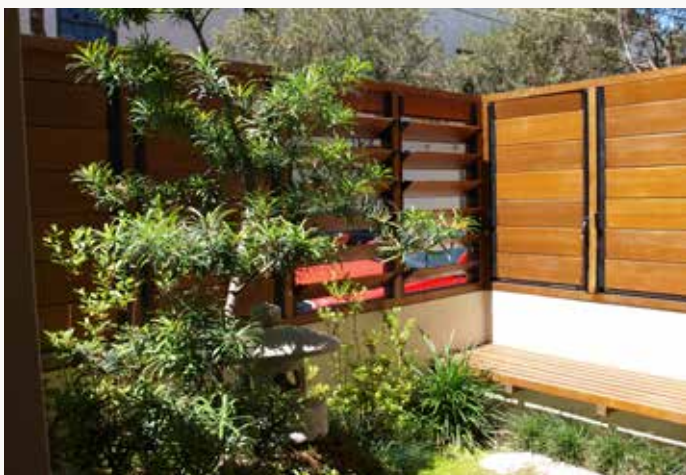
- ① Living
- ② Dining
- ③ Courtyard
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- ⑤ Bathroom
- ⑥ Laundry
- ⑦ Bedroom



Three-garden terrace

Layout changes, double glazing and a creative approach to outside spaces transform a small Sydney home.

WORDS Anna Cumming



WITH ITS SERVICE AREAS BLOCKING A CONNECTION TO the rear yard and an enclosed, south-facing living space, this tiny terrace house in the inner Sydney suburb of Newtown was suffering from heat loss and a lack of natural light. “In addition, the house lies under a flight path so aircraft noise was a problem,” says Matt Day of Day Bukh Architects, who took on the challenge of transforming it into a sustainable home with the highest star rating possible given its south and west orientation.

There wasn’t much room to move on the 112-square-metre block, but some key layout changes, the extensive use of double glazing and a creative approach to the outside spaces have led to a successful renovation that achieves 7.5 Stars. The rear half of the house was demolished and rebuilt as an open-plan kitchen and living area with full width stacker sliding doors connecting it to the rear garden, one of three now making the home more liveable.

“The main concept of the renovation was this idea of three gardens: a morning-to-midday garden, an afternoon garden and

a ‘breathing’ garden,” explains Matt. The north and east-facing Japanese-style garden at the front of the house captures the morning sun and is enclosed with a louvred timber fence for added privacy from the street. The back garden is sunny in the afternoon, and a covered deck and low-e coated double glazing protects the new living area from too much summer heat. The third garden is a tiny space in the middle of the house onto which the living room and bedroom look, providing another direct link to the outside. “It’s not a garden you can sit in, it’s a breathing and light garden that’s also great for cross-ventilation,” says Matt.

Matt’s team installed a heat recovery ventilation system to keep the home’s inside air clean and fresh, and paid careful attention to sealing and insulating the house to address the twin problems of heat loss and aircraft noise. “This, plus the connection to the gardens, has markedly improved the living quality of the house,” says Matt. **S**



Kitchens & bathrooms



Image: Elizabeth Santillan

The rustic look

THE OWNERS OF THIS HERITAGE-

listed 19th century cottage in Brisbane fell in love with it the moment they saw it and enjoyed its 'quaintness' for 10 years before they renovated, altering the kitchen and bathroom significantly to be more family-friendly.

The cheerful kitchen blends rustic charm with modern highlights. The cabinetry doors were made from recycled v-joint (VJ) boards with their original paint left intact for a decidedly rustic look. Designer Druce Davey says the boards were

literally lying unused under the builder's house before becoming kitchen doors that can evolve by way of a lick of paint when the clients feel like a change in years to come. Tiled faces line open wall cabinets that have been made from recycled timber floorboards. The carcasses of the kitchen were made from long lasting form ply.

A repurposed claw foot bath, basin and timber box shelves were added to an existing bedroom to turn it into a new bathroom that leaves the original architectural features and finishes intact (see p35).

DESIGN

– Greener Kitchens +
Bathrooms

LOCATION

– Brisbane, QLD



The Warringah Creative Space.
Image courtesy Warringah Shire Council

A space reclaimed

An old, decrepit scout hall has been transformed into a community arts space using mostly salvaged materials.



A community planting day at the Warringah Creative Space. The new garden is bursting with edible and medicinal plants.

WORDS Beth Askham

PHOTOGRAPHY Bettina Kingma

CRAFTED WITH CREATIVE THINKING

and secondhand materials, artists in Sydney's northern beaches have made the Warringah Creative Space their new home.

The scout hall's transformation was a partnership between Warringah Council, Kimbriki Resource Recovery Centre and the local community. The centre includes studios and a gallery space and is being used by artists working in a range of mediums, including mosaic, clay, paint and photography.

A zero-waste policy was applied to the rebuild and everything was treated as a resource. About 80 per cent of the materials used in the new build were reclaimed, with the original timber, the old tin roof, bricks

and even concrete blocks from the old toilet block all put to use in the new building. The renovation produced only one cubic metre of landfill waste.

Dr John Warburton, community deputy general manager at Warringah Council, says many councils want to reduce their carbon emissions but find it difficult to do in practice. At the beginning of the scout hall redevelopment he realised it meant doing something different and leading by example.

Accustomed to working with a detailed and prescriptive building plan, using secondhand materials was something new for the council. Applying a rigid mindset to a project that uses secondhand materials

is impossible, John says. Without knowing what materials you will salvage there's no telling how you will incorporate them into a new building. "Every single week the construction team's building design would change based on what materials were available. It was a creative process that kept on evolving," he says. Convincing everyone to go on that ride was not easy but he believes the end result proves the process can work.

More than simply meeting its waste goals, the project has been an outstanding success. The gallery is booked out for months and there is a queue of artists wanting to use the studios. John says: "One of the keys to the success is that we wanted



"If it can't be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned or removed from production."

Pete Seeger

to really create a building that came from the local community and was not imposed on them. We included local residents in the rebuild – everyone we could think of was encouraged to get involved and people came and mulched, scraped, planted and painted."

Landscaper and secondhand material advocate Andrew O'Sullivan was also heavily involved in the rebuild. As a fierce advocate of reusing and respecting old materials, Andrew hopes it stands out as an example for renovators everywhere. "A lot of the old materials have a beautiful patina, are great quality and are built to last. If we don't change our mindset we will lose these beautiful materials and have them replaced with materials that are not as good."

"Reused materials don't have to look secondhand – they can look brand new," Andrew adds. He points to the new

windows that blend in seamlessly with the secondhand ones.

Warringah Mayor Michael Regan says the council saved tens of thousands of dollars through reuse and reducing building site waste: "We haven't wasted a thing."

Outside, the soil from the old site was reused in the newly landscaped garden beds and more than 200 species of edible, medicinal and rainforest plants were planted by the community during a Saturday morning working bee. Plants include black sapote, mangoes, white mulberries, paw paw, guava and even a neem tree. The garden is not only a pleasurable place to be, but somewhere you can pick the ingredients for a cup of tea or a culinary dish. The garden is in good hands – neighbours come across to water it and there are workshops held in its grounds.

Some councillors were worried that people would vandalise the space – the fate of the old scout hall – but so far not one plant has been removed and there has been no vandalism. John and Andrew believe the community has a sense of ownership and is respecting and protecting the new building. Both feel they have proved the point that when the community cares about a place, it will be looked after. 📍

Bettina Kingma is a photographer currently based on Sydney's Northern Beaches. She carries out her photography with a photojournalistic approach which aims to capture the emotions and ambience of her surroundings in her own unique style.





Hydronic heating



WORDS

Dick Clarke

As most of us look forward to relief from heat waves and bushfires, we must also deal with winter's downside – the need for heating.

PASSIVE SOLAR HEATING SHOULD

always be our first option, but for many homes, limited solar access makes this unattainable. Hydronic heating is one of the low energy products we can use to achieve powerful comfort without massive energy use and, if done properly, any net emissions.

Hydronic heating is the use of hot water to heat the occupants of a building. This can be done by using convection radiators or hot water can be piped through walls and/or floors, which then radiate warmth to the occupants within. This latter technique has become the most common and has several advantages, although it is more costly to install. Hydronic heating must not be confused with electric resistive element heating, which is a very different beast, and not at all sustainable in all but a very few instances. In Australia, 'hydronic heating' is commonly used to refer to gas-fired systems, with or without solar preheating. However heat pump systems are gaining ground, often using PV as the sole electricity source.

Hydronic heating is so effective because of water's capacity to hold about 4000 times more warmth than the same volume of air.

HUMAN COMFORT

Our perceptions of comfort are a key consideration when it comes to heating. Radiant heat is so effective it doesn't need to be 'hot' to provide warmth. If the surfaces of a building are between 20 and 22 °C the building will not feel cold, and another degree will put it into most people's comfort zone. This enables the air temperature to remain cool enough to prevent that fuggy, drowsy feeling and keep occupants comfortable and, importantly in workplaces, alert. With radiant heat there is an element of conduction at work too: if the floor is heated, cold feet are a thing of the past.

EFFICACY

Building conditioning versus air conditioning

The way hydronic heating effects human comfort – its efficacy – is the key to its growing fan base. It hinges upon water's thermal mass; that is, its ability to absorb, store and redistribute enthalpy (any heat energy, but warmth in this case). If combined with high mass materials such as concrete slab floors, brick walls, phase



A wall-mounted hydronic radiator panel.



change materials in floors or walls, or even by itself in timber-framed floors and walls, hydronic heating has the capacity to completely overpower the air temperature within a building. This is because water can hold about 4000 times more warmth than the same volume of air. Thus air-conditioning must heat and move much more air to achieve the same effect and, arguably, never can.

Power source options

Of course we must address more than just hydronic heating's ability to distribute energy. A system's energy source must also be considered if we are to arrive at an environmentally sustainable heating solution – this is where hydronics really shine.

Until recently solar hydronic heating systems have drawn energy from the sun, usually via evacuated tubes, in combination with instantaneous gas boosting. In these systems, solar collector size has been critical to ensure minimal reliance on gas boosting. Yet the relatively high cost of solar collectors has seen many undersized systems installed. This approach might reduce

sticker shock for homeowners but it results in higher running costs and, of course, greenhouse emissions that are inescapable with the use of any fossil fuel.

More recently, the continued price reduction of photovoltaics (PV) coupled with ongoing improvements in the energy efficiency of electric heat pump hot water systems means it has become more cost effective to use these systems. One of the most efficient heat pumps, for instance, is the Sanden range, the largest of which has a coefficient of performance (CoP) of 4.5, meaning that for every unit of energy you put in, you get at least 4.5 units of heat out when delivering water at 60 °C. This is the big distinction between heat pumps and resistive heating elements, which by definition have a CoP of 1. This level of efficiency, coupled with a solar PV power source, is cost-effective, can be completely emissions free and has an embodied energy payback period measured in just a handful of years. [Ed note: The Sanden unit is one of a number of similar products made in Japan under the 'Eco-Cute' brand, but so far it is the only one imported to Australia. For more information on heat pump hot water

systems, see our article in *Sanctuary 26* and the ATA's efficient hot water buyers guide www.ata.org.au]

SYSTEM SIZING & CONFIGURATION

There are a number of solar hydronic system configurations available to suit different installation requirements, but all involve either solar thermal and PV or a heat pump and PV.

The appropriate PV system size for solar hydronic heating depends on heating demand, which is a function of the floor area to be heated, building thermal efficiency (passive solar input, insulation, etc.), and desired temperature relative to external ambient temperature. Competent installers can work with good designers to calculate this, but as a guide, a thermally efficient house in Sydney with partial passive solar input requires about 1.5 kilowatt-peak (kWp) of PV to run the hydronics system's heat pump and circulating pumps. A home with no passive solar at all may require 3kWp. If installing PV on your house itself is not an option, you can use renewable energy by proxy through community-owned systems or GreenPower.

Also, note that while the most cost-effective option may change as technologies develop in years to come, the principles for selection will remain the same. [Ed note: Find out more about solar PV sizing and pricing from the ATA www.ata.org.au]

Additional savings may be gained by combining a hydronic heating system with a household potable hot water system. This is because hot water in a vertical storage tank stratifies, leaving the hottest water at the top of the tank. Potable hot water can then be drawn from the top of the tank at over 60 °C and mixed with cold water by a tempering valve to meet regulated maximum household hot water temperatures. Meanwhile, slightly cooler water suitable for in-slab hydronic systems is drawn from the middle of the tank and pumped through hydronic pipework. Rotex solar thermal systems are well-known for this hybrid use feature. Such a system configuration means that the heat collection side of your system must be expanded, of course, so economies of scale and summer heating requirements need to

be considered.

However, we have found that it is often more economical to use a bigger PV system to power two smaller heat pumps, each with their own tank, thus separating potable and hydronic hot water completely. The size of your system will also depend on the area to be heated. To maximise efficiency, it is definitely worth splitting this into zones that can be heated separately as required. This eliminates wastage in larger buildings. Once again, it is one of the many advantages of building small.

APPLICATIONS

Hydronic heating can be used in many different building applications, and is an appropriate design strategy in any climate requiring more than occasional winter heating.

New builds

Most commonly, hydronic heating in new builds is embedded into concrete floor slabs in the form of a rectilinear spiral of plastic tubes tied to the slab's reinforcing top. But

it can also be installed into lightweight wall and floor framing in contact with the surface material, be it plasterboard or floorboards. If the heat is not to be shared with the space on the other side, say in the case of a raised timber floor at ground level, then the space behind must be insulated – and probably lined to make it vermin free. External walls should be insulated on one side to direct heat inside. Internally, heat can be delivered to more than one room where the pipes are in contact with surfaces on both sides of the wall and the wall itself is not insulated.

Renovations

Hydronic heating is a suitable option to consider when renovating as it can be retrofitted into timber-framed walls and floors. Concrete slab retrofits are only worth considering if you can add a 60mm topping over the existing floor. Brick walls can be retrofitted if there is space to add 30mm of render on the inside surface beyond the pipework – and insulation in the wall cavity for external walls. Convective radiators are



Hydronic heating pipes installed in an existing timber stud wall, with the original plasterboard retained on one side. This wall is also having tamped earth installed between the studs to increase the thermal mass, but the efficacy of hydronic heating is not dependent upon this.



In-screed hydronic floor heating. Pipework is laid on a finished slab and then covered with a top layer of cement screed. Hydronic heating heat sources can include electric heat pump, gas, wood or solar, or combinations thereof.



an option in full masonry buildings, but these don't provide the full radiant heat effect across a large surface area.

At this point it's worth dispelling a myth – you can install hydronic heating below a timber floor without them cupping. A timber floor exposed to direct sunlight will easily achieve a surface temperature in excess of 55 °C, while the hot water from a hydronic system is usually in the range of 35 to 50 °C; that is, no more than sunlight. Additionally, hydronic pipe is only in direct contact with the floor at a series of isolated points. There is therefore less heat transfer than direct sunlight, which covers 100 per cent of the exposed area.

It is also worth considering hydronic

heating in modular construction. It can be installed along with all the other plumbing, and as discussed above, is great for lightweight buildings. It can also be used to complement phase change materials, which are already making their presence felt (pun intended) in this realm.

Hydronic heating is not the panacea for all ills, and should never be a substitute for passive solar heating when that is available. As an adjunct to it, or as a heating system where winter sun is unavailable, it is probably the single most useful design strategy since the invention of glazed windows. ⑤



Products



Image: Emma Cross

01

MARMOLEUM/LINOLEUM

Invented in 1855, marmoleum is a natural floor covering made from linseed oil, rosins, wood flour, cork flour, limestone and organic pigments, all held together with a jute backing. The ingredients are pressed together to form sheets or tiles and then dried to become a durable, waterproof floor covering. Marmoleum is biodegradable and recyclable, and doesn't contain any VOCs. It's soft and comfortable underfoot and, thanks to the linseed oil, it's also antibacterial.

There is an array of patterns and colours available and it's a versatile floor covering that can also act as a benchtop covering or shelf lining.

Marmoleum is a trademarked name for this product by Forbo flooring systems. The original linoleum was made from these natural ingredients and was named by its maker from the Latin words linum (flax) and oleum (oil). The 'lino' we talk about today is a generic term that largely refers to the floor covering made from PVC (vinyl).

www.geca.org.au/products/all/782



02

INSTYLE WALLPAPER

Instyle's range of natural wall coverings, CUBISM, GILDED CORK and PIETRA, are made from cork and cellulose (with added metallic leaf and polyester in the gilded cork range). Inks used in their manufacture are water soluble and they are free from heavy metals and chemical additives such as PVC, chlorine and urea formaldehyde.

These wall coverings are suitable for both walls and ceilings and are water permeable to avoid mould and mildew. They are available in a range of colours.

www.instyle.com.au



03

SOLAR TUBE

This portable 'Sydney Tube' solar cooker can boil water in 20 minutes and cook or smoke food. The cooker includes a water jug and stainless steel grill to cook meat and veggies. The cooker is great for park barbecues as it folds up into a case with a carry handle. The smaller model weighs 8 kg with the larger model weighing 10 kg. Prices start at \$525

www.runonsun.com.au

04

WOOD MELBOURNE TIMBER BATH SPOUTS

These water spouts, made by Wood Melbourne, are handcrafted from 80-year-old reclaimed blackbutt timber. They have internal brass plumbing and a chrome-plated aerator.

The spouts are painstakingly crafted by Oliver MacLatchy in his workshop, where he de-nails, shapes, glues and then waxes the timber four times to seal against moisture. There are two variations, the Isla and the Kiri. Price \$450 + GST

www.woodmelbourne.com



05

GINGHAM OLD YARN RUG

These old yarn kilims are designed by Jordan Lab and manufactured by traditional rug makers in Turkey. The kilims are made from 100 per cent recycled wool sourced from Turkish rugs at the end of their life. This wool is then rewoven by hand using traditional techniques. The consistency and colour will differ through the yarn creating a unique variation in tone and colour that can only be achieved by age. Available in three sizes, starting from \$3368.

www.jordan.com.au