

MODERN GREEN HOMES Sanctuary

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EARTHY TEXTURES

A hemp & rammed earth home

Resilient design
Small & tiny homes
Material inspiration

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A solar power system from Tindo Solar

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Earthy modern living

A Melbourne hempcrete and rammed earth home takes bold steps in environmentally sustainable family living.

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PHOTOGRAPHY Rhiannon Slatter

BEYOND ITS PARED BACK STREET FAÇADE, Michelle and Chris' home is impressive. The modern design incorporates clean lines, generous and smart spaces, high ceilings, double glazing and classy furnishings. Though first and foremost a family dwelling, it's also an 8 Star home designed with environmentally responsible living firmly in mind.

Stepping through the front door, your eyes are immediately drawn along the hallway to the north-facing open plan kitchen, dining and living area, beyond which are the deck and garden. Contrasting yet complementary textures – industrial and earthy – cut through the modern exterior and sleek fit-out. A polished concrete floor and white walls greet the floating timber staircase and rich timber window

frames. In the living area, rammed earth walls are warm and inviting.

As you walk through, you can't miss the unusual textures of the hempcrete wall to your left. Unlike its counterpart on the other side of the hall, this wall has been left unrendered, exposing the fibrous hemp that progressively stores more carbon dioxide and becomes stronger.

There's no doubt that hemp and rammed earth are environmentally impressive, but architect Steffen Welsh believes materials should also be aesthetically pleasing. "If [a material is] not beautiful you won't use it just because it stores carbon dioxide."

Steffen is a convert to rammed earth. "We have worked with rammed earth before and it has



→ A west-facing courtyard aids cross-ventilation, making the most of cooling south-westerly breezes in summer. Michelle has added exterior blinds to the double-glazed windows to block unwanted sun. Bamboo will be planted along the western fence to further reduce unwanted sun.

④

The south-facing front façades of these two hempcrete and rammed earth homes in Northcote are designed to be small and compact to limit heat loss and gain.

very good acoustic qualities,” he says. “It softens the sound within the space.” Because the porous wall has more surface area, it can also absorb more heat. And it’s a local material: “It comes from quarries within Victoria, so I would consider it a very contextual material.”

Hempcrete is a newer material for Steffen. Although he hasn’t undertaken a life cycle analysis, he says hemp’s ability to make a wall carbon neutral makes sense. “To us it looked like it had very similar qualities to the rammed earth.” In the original plans for the house, the walls were to be built entirely of hempcrete or rammed earth but the hempcrete proved difficult to build with during Melbourne’s winter when construction took place and so was ruled out for external walls. Despite this, Steffen is keen to work with hempcrete again. Now all he needs is another adventurous client who is prepared to take a risk, he adds. [Ed note: See page 91 for more on walls made from hemp.]

There’s much more than hempcrete and rammed earth that give this house its environmental credentials, however. Several years ago Michelle, Chris, their two kids and their dogs had outgrown their Edwardian terrace. They needed more space

inside and outside. At the same time, Michelle’s parents wanted to downsize from the large family home they had built in the 1980s. Michelle and Chris found a 900-square-metre block in Northcote and approached Steffen to design two homes, complete with a shared backyard.

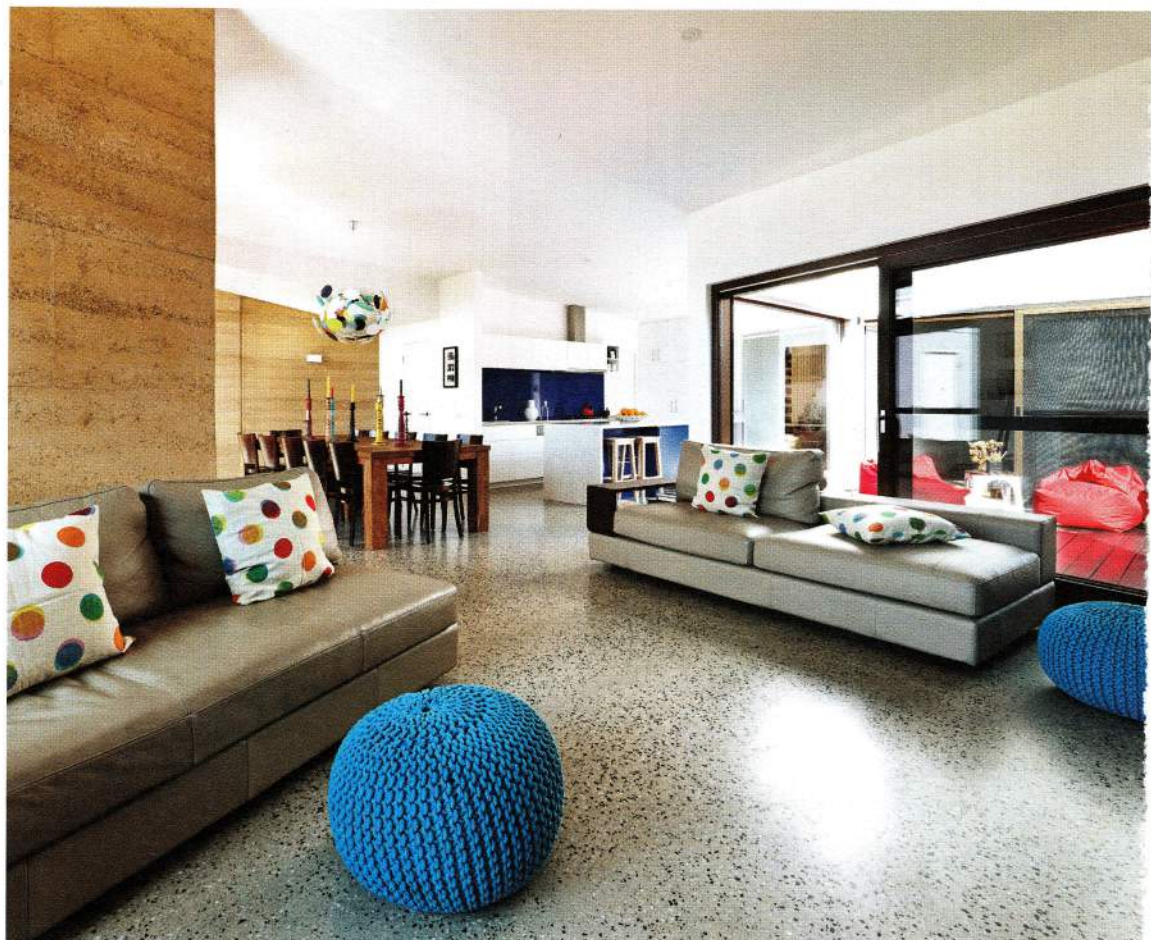
Steffen says he was initially intrigued that Michelle and her family were trying to do something outside the box. “It was three generations and they wanted to build a house [each] and explore co-housing, which seems to be very sensible but it’s not practised and hasn’t been realised to the extent that it should,” he says.

Working to their requests for a home that maximised passive solar design and incorporated renewable energy and water saving technologies, natural light, generous living spaces and a large backyard, Steffen designed two double-storey homes centred around internal courtyards.

“I find generally that the courtyard house is a very suitable model for Melbourne’s environment,” Steffen says. “You can increase the number of rooms that are north facing, you can improve cross-ventilation ... You achieve separation as well as connection within the family.” →



➔ A large north-facing living area is light and bright thanks to significant areas of double glazing, a void above the kitchen and a high ceiling.



➔ Homeowner Michelle had an additional joist built into the ceiling to ensure this swing could be installed. Security flyscreens are installed in the double-glazed windows.

The design makes the most of air flow within and through a double-storey house: hot air rises and can vent out through clerestory windows in summer, while in winter heat rises up the stairs to the bedrooms. The design is proving itself in practice. "Since the hot February we had, the temperature [inside] has been beautiful," says Michelle. With in-slab hydronic heating, double glazing and its highly insulated walls and roof, the house is warm and peaceful in winter. Upstairs, the hottest days of summer were too warm for the family, however, and they are considering installing an evaporative cooling system.

To further improve the home's passive cooling, the couple have added blinds to the courtyard windows and are planning to plant bamboo and other natural shading. Also on the cards are a pond for the eastern courtyard and hosting a Perma blitz to get the garden into shape.

After a lengthy design and build phase, including a frustrating year for Steffen waiting for planning approval from the local council and then the Victorian Civil and Administrative Tribunal, Michelle and Chris and Michelle's parents next door are very happy with their new homes.

They were about 10 per cent over their budget of around \$700,000. Surprisingly, Steffen says that as building materials, hempcrete and rammed earth aren't necessarily more expensive than highly insulated conventional walls.

Michelle and Chris are still making final touches to their home, but they are clearly very happy with it. Steffen is also pleased with the result: "By the time we landscape the front yard, [the house] will disappear. I quite like that. It was never meant to be a statement – it's supposed to be two comfortable family homes." ⑤



The stairs lead to three bedrooms and a bathroom. Windows that open automatically at the top of the stair void help vent warm air in summer before it reaches the bedrooms. A pond is planned for the eastern courtyard.

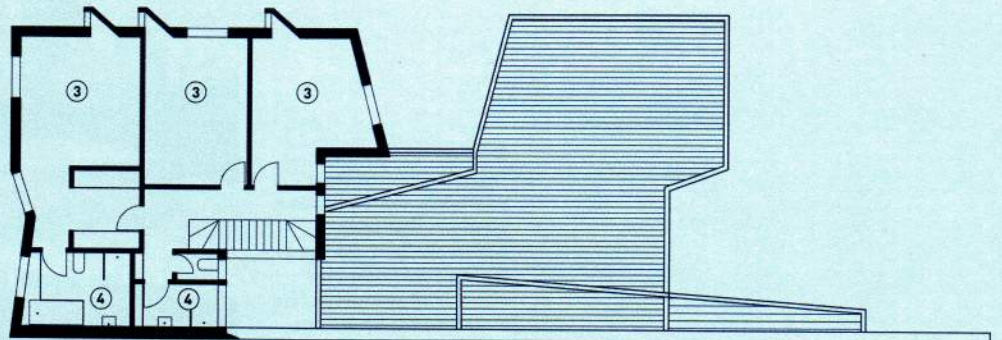


Northcote home

—Specifications

Credits	Sustainable Features	
DESIGN Steffen Welsch Architects	HOT WATER <ul style="list-style-type: none">– 30 Apricus evacuated tubes with 315L tank and separate boost switch so boosting is done only when required– Rinnai 26 gas booster with pump, sensors & controller by Hydrotherm.	Wattworks. Greywater is collected from internal outlets (except kitchen and toilet) and supplies water to the garden beds through a drip line <ul style="list-style-type: none">– 4.5–5 star WELS rated tapware.
BUILDER Melbourne Homes of Distinction	RENEWABLE ENERGY <ul style="list-style-type: none">– 1.76kW grid-connected photovoltaic array with 5kW inverter, leaving the option open to attach additional panels at a later stage.	PASSIVE DESIGN Zoning <ul style="list-style-type: none">– The house is zoned with main living spaces facing north and secondary living spaces facing south– Bedrooms are located upstairs without heating and cooling. Airflow from downstairs can be directed to allow warm air into the bedrooms in winter or to escape the building in summer before entering the bedrooms.– The house is built to maximise thermal mass and insulation and minimise heat loss.
JOINER Jensen & Row	WATER SAVING <ul style="list-style-type: none">– Rainwater is collected from all roof surfaces into 2 x 5000L underground water tanks, supplied by Tankmasta– Rainwater collected is plumbed to all toilets and external taps– Greywater system by SmartPit	Building layout and orientation <ul style="list-style-type: none">– Central courtyards were introduced to maximise northern orientation of living spaces and cross ventilation in summer– Large north-facing windows for solar gain in winter and smaller openings facing south– High-level motorised window openings to the north and smaller proportioned windows to the south allow natural convection and cooling.
PROJECT TYPE New build		Passive and active solar control <ul style="list-style-type: none">– Eaves are dimensioned to allow winter sun penetration and summer shading– External blinds provide shading to west and east-facing windows and north-facing windows where there are no eaves.
PROJECT LOCATION Northcote, VIC		
SIZE House 215 sqm, land 907 sqm		
BUILDING STAR RATING 8 stars		

FIRST FLOOR PLAN



ACTIVE HEATING & COOLING

- Hydronic in-slab heating to entire ground floor installed by Hydrotherm
- Morsø 7648 wood heater selected for its efficiency and relatively low emissions
- No cooling throughout, although Michelle & Chris may install an evaporative cooler upstairs.

BUILDING MATERIALS

- Polished concrete slab with 30 per cent fly ash
- R1.5 slab edge insulation by Foilboard
- Roof: timber with R4.5 Glasswool batts, an air gap and R1.5 reflective roof blanket
- Spotted gum external decking and fencing.

Walls

- Rammed earth walls by Olnee Constructions: 400mm thick with 50mm internal polystyrene insulation
- Hempcrete walls by Baw Baw Sustainable Constructions
- Light timber framing with wall insulation and 75–100mm EzyClad rendered polystyrene cladding achieves a total R-value of 4.3.

WINDOWS & GLAZING

- Double-glazed doors and windows imported from Germany by Timber Tech Windows
- Doors and windows have inbuilt draft and weather seals as well as a locking mechanism that seals when closed
- Low-e and argon-filled double glazing with 16mm air gap

- Remote-controlled high level awning windows for ventilation.

LIGHTING

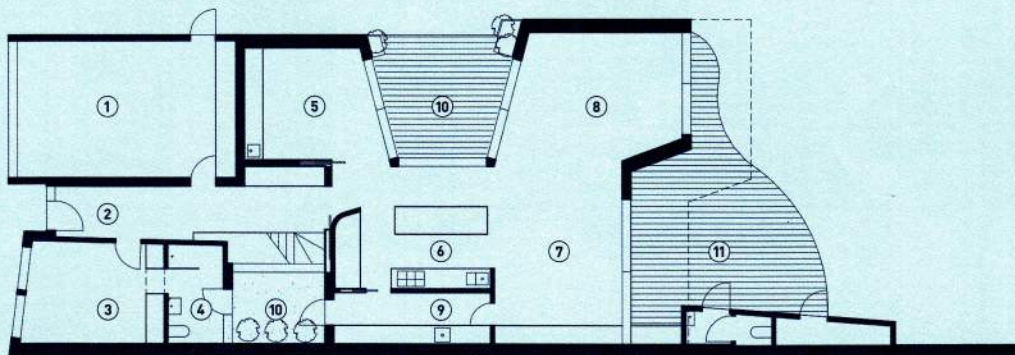
- Majority of lights are LED light fittings supplied by Ambience
- Wall-mounted light and pendant lights fitted with CFLs.

PAINTS, FINISHES & FLOOR COVERINGS

- Kunos Natural Oil by Livos for polished concrete floors
- Natural wall paint by Livos on rendered hemp walls. This product allows the wall to breathe.
- Low VOC Intergrain Ultrafloor finish to stairs and decking
- Dulux Eco Choice low VOC paints elsewhere.

OTHER ESD FEATURES

- Locally-sourced recycled blackbutt & messmate benchtops as well as local timber veneers
- External sunshading by Sheerblinds installed for active sun control.

GROUND FLOOR PLAN**LEGEND**

- | | |
|------------|-------------|
| ① Garage | ⑥ Kitchen |
| ② Entry | ⑦ Dining |
| ③ Bedroom | ⑧ Living |
| ④ Bathroom | ⑨ Laundry |
| ⑤ Rumpus | ⑩ Courtyard |
| | ⑪ Deck |



A spacious hall leads through the home past two courtyards to the north-facing living, kitchen and dining rooms. Both hallway walls are 300mm-thick hempcrete and timber-frame construction, providing excellent acoustic insulation. The wall to the right has been finished with a lime-based render, while the wall on the left has been left exposed and unfinished.