MODERN GREEN HOMES

Sanctuary

ISSUE 63

HEMP BUILDING SPECIAL

PLUS: Renovating heritage homes for sustainability; National Biophilic Design Awards; swap your lawn for habitat

Hemp Sensation

Seven gorgeous hempcrete homes inside

WIN

One of two e-scooters from Voltrium, with a total prize value of $6,500

Offer open to Australian residents. Details page 81

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A new approach

LOCATION Eerwah Vale, QLD • **WORDS** Emma Scragg • **PHOTOGRAPHY** Alain Bouvier

At a glance

- 8.9-Star off-grid hempcrete home
- Built on a budget using both hand-tamped and spray-on hempcrete
- Passive solar design with outdoor living spaces and shady pergolas to come

Mark and Megan's off-grid family home on the Sunshine Coast was a test case for the spray application of hempcrete.

Former Sydneysiders Megan and Mark fell so in love with the Sunshine Coast hinterland on a family holiday that they immediately put their house on the market and began searching online for a new home. They found a 25-acre property with a rundown shed that piqued their interest, and Mark made a special trip to visit and made an offer the same day, stunned by the beauty and potential of the land. Mark then spent two weeks renovating the shed before pregnant Megan and their two-year-old daughter moved up, and the family began four and a half years of designing and building their dream home.

Mark and Megan were interested in alternative construction methods with exceedingly good thermal efficiency as well as low embodied energy. "We used to live in a beautiful timber house, but in summer it was sometimes 40 degrees inside and in winter it was freezing. We couldn't heat or cool the place efficiently," Mark remembers. They had been interested in the benefits of hemp for years, so were excited to discover hempcrete in their search for natural building materials. "We really wanted to build in hempcrete, but had no idea whether we could afford it."

Happily, they found designer Brett Grimley of Ecolibrium Designs only 10 kilometres away, who had recently designed a hempcrete house and happened to be on the same social frisbee team as Mark. Their brief to him was simple. "We wanted a liveable house where we didn't have to be constantly spending money on lots of heating and cooling," says Mark. Ecolibrium's design is a classic, well-designed passive solar home – facing north, with the kitchen in the north-east corner to make the most of the morning light and mountain views, and well-placed louvre windows for abundant cross breezes. The layout is designed to adapt comfortably over the next 20 years as their young daughters (now aged 6 and 8) grow and finish school.

Good detailing is an essential part of designing for hempcrete construction: "A good hat and good boots – that's the aim, to help keep the water out," says

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"We thought it might be difficult to get building approval for hempcrete as a relatively new and untested material, but once we had a set of drawings and a local engineer to work with us, there was no problem," homeowner Mark says.

Brett. The timber frame of Megan and Mark's home is fully encapsulated in hempcrete, with a continuous skin of naturally moisture-resistant lime render to the exterior beneath the wide 'brim' of the roof. Window openings are boxed out with rendered fibre cement sheet that provides an impermeable barrier between the window frame and the surrounding wall. Wet areas are also detailed with care, building a gap between wet area walls and hempcrete as 'insurance' for if and when membranes and seals fail. "Bathrooms always leak," says Brett.

Hempcrete installer Tom Cunliffe of Resolute Construction Solutions started his hemp journey in 2003, producing hemp seed health foods. After helping on a few hempcrete builds, he was hooked, changing career for good. He began to realise, however, that "because it's so labour intensive you can't economically hand-tamp a whole house worth of hempcrete – unless you do it yourself and ideally get friends and volunteers to help."

Tom had been looking into ways to make hempcrete more affordable, and Mark and Megan's budget was tight. He was interested in trialling sprayed hempcrete, popular in Europe, and offered to train Mark up and lend him the equipment to build hand-tamped internal walls while the Resolute team perfected their spraying technique on the external walls. Spraying the complete mix proved impossible, as the hemp fibres swelled and clogged the line, so Tom adapted an insulation blower with two nozzles spraying simultaneously – one spraying the hemp and the other lime and water, mixing them in the air. The winning technique was to spray the hempcrete onto hessian fixed to the frame, building up layers on each side.

Brett and Tom both see this technique – which removes the labour of building formwork and hand-tamping – as a way to make hempcrete a cost-competitive alternative to brick veneer. "It becomes a no-brainer from sustainability and performance points of view. You're getting an R-value of 4 as opposed to maybe 2.5 for brick veneer, which also gives you the thermal mass on the outside: it's all wrong. With sprayed hempcrete, you also get a beautiful rendered finish outside and inside, which generally people can't afford. It has enormous potential," says Brett.

The main reservation Mark and Megan had about natural materials in

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The interior hempcrete walls were cast in situ and hand tamped, while the exterior walls used spray-on hemp construction.

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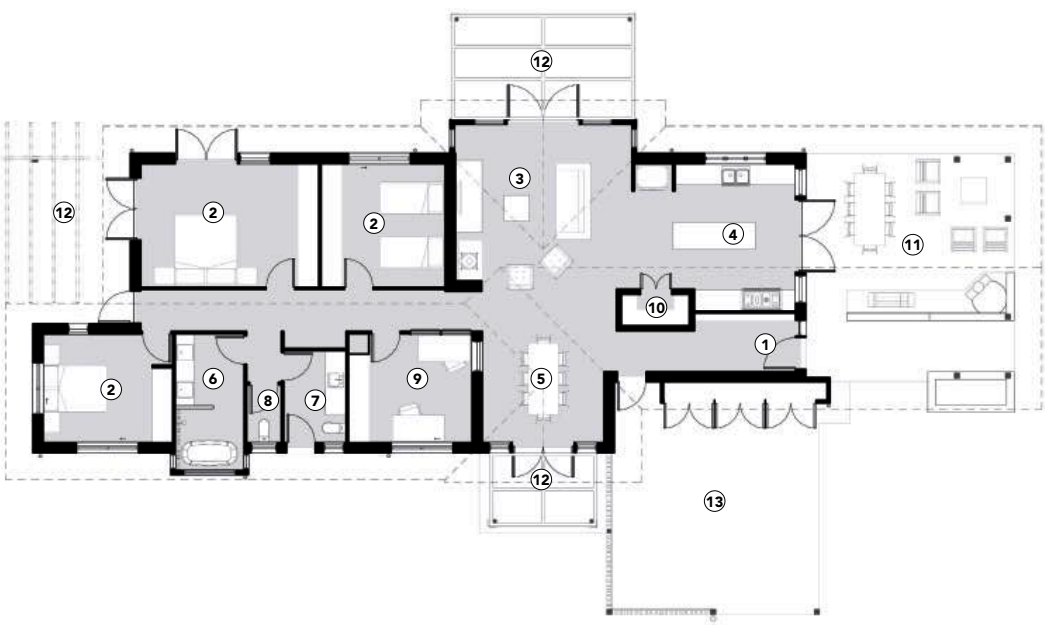
The kitchen will one day open to an outdoor living area. Wet area walls are finished in Rockcote Marrakesh – applied and hand polished by Mark and Megan – over a Villa board substrate and waterproof membrane.

this subtropical climate was the risk of mould, but the hempcrete has excelled. “Last year, we had the most horrific wet start to the year, and everybody’s houses were growing mould inside for months, but Megan and Mark reported that their house always felt dry,” says Brett. “That could only come from the hempcrete and its ability to regulate humidity inside. It was an incredible test of that property of the material.”

The couple are delighted that they have a home that outperforms their expectations. “Through winter it was outstanding: the first winter, we had no heating at all and it was five degrees outside at night and 18 degrees inside. It hasn’t performed so well in summer, when there’s usually only about three degrees difference between inside and out, but that’s probably because we prefer fresh air and breezes and often open windows,” says Mark. “It’s still a good result, though. We’ve got 900-millimetre eaves all around, so in summer we’ve got plenty of shade, and whichever way the wind’s blowing, we’ve got good airflow.”

The home feels beautiful to walk into. “It’s like going into an earth-built house,” says Brett. “It has that non-tangible but very noticeable feel of comfort and security. I think that’s partly the thickness of the walls. There’s this natural homeliness that the hempcrete creates. Hemp is the gods’ gift to humans, I think, because it’s so incredibly versatile. We should be using it as much as we possibly can.”

FLOOR PLAN



LEGEND

1. Entry
2. Bedroom
3. Living
4. Kitchen
5. Dining
6. Bathroom
7. Laundry
8. Toilet
9. Study
10. Pantry
11. Future outdoor living
12. Future terrace with pergola
13. Future carport

HOUSE SPECIFICATIONS

HOT WATER
- Solahart roof-mounted solar thermal hot water system with bottled gas boost

RENEWABLE ENERGY
- 6.6kW off-grid solar PV system with 14.4 kWh battery storage

WATER SAVING
- 80,000L rainwater tank collects all roof water and supplies house and garden needs
- Ozzi Kleen RP10 advanced secondary wastewater treatment system

PASSIVE DESIGN, HEATING & COOLING
- North-facing orientation: long east-west axis minimises eastern and western summer sun exposure, while maximising winter sun penetration
- 300mm-thick hempcrete walls give great insulation and regulate humidity and temperature
- Ground-connected concrete slab floor for thermal mass
- Louvres positioned for good cross ventilation through the middle of the house
- Deep eaves provide summer shading
- Stage 2: a deciduous vine-covered pergola to the north of the living room will provide summer shade and allow for winter sun penetration; an evergreen vine-covered pergola will provide deep shade from the west; and a vegetated southern pergola will provide natural cooling for south-easterly breezes before they pass through the house

ACTIVE HEATING & COOLING
- Ventair Royale II DC ceiling fans in living spaces and bedrooms
- Jotul F3 wood heater (rarely used)
- Solartube Solar Star RM1600 roof ventilator with thermostat removes air over 28°C from the roof cavity

BUILDING MATERIALS
- 300mm-thick Tradical hempcrete exterior walls: timber frame with hempcrete sprayed onto hessian, rendered with Tradical PF80 render
- Small sections of timber-framed, rough sawn hardwood-clad walls with Enviroseal ProctorWrap RW vapour-permeable building wrap
- Ground-connected concrete slab
- Colorbond roof
- Internal feature hempcrete walls built using formwork and hand-tamping, and left raw with a water-sodium silicate mix (water glass) sprayed on sparingly to prevent loose hemp dislodging
- Insulation: Hempcrete external walls (R4), Rockwool batts to hallway walls (R2.7) and to timber-framed, hardwood-clad walls (R2), CSR Anticon heavy duty roof blanket to roof (R3)
- Travertine floor tiles

WINDOWS & GLAZING
- Cedar-framed, single-glazed windows and doors by Trend Windows & Doors
- Louvres used extensively to maximise natural ventilation

LIGHTING
- LED lighting throughout

COOKING
- Bottled gas cooktop for energy resilience (see Insights)

PAINTS, FINISHES & FLOOR COVERINGS
- Tradical PF80 render to exterior and interior of sprayed hempcrete walls
- Water glass sealant to raw internal hempcrete walls
- Rockcote Ecostyle low-VOC interior paints
- Rockcote limewash to plasterboard hallway walls
- Hand-polished Rockcote Marrakesh (lime-based tadelakt) to bathroom walls
- Linseed oil to timber doors and windows

OTHER ESD FEATURES
- Secondhand laundry tub found on Gumtree, sealed with an eco concrete sealer

DESIGNER
Brett Grimley,
Ecolibrium Designs

BUILDER
Scott Christensen,
Sec Constructions

HEMPCRETE INSTALLER
Tom Cunliffe, Resolute Construction Solutions

PROJECT TYPE
New build

LOCATION
Eerwah Vale, QLD
(Gubbi Gubbi Country)

COST
$450,000

SIZE
House 176m^2
Land 10 hectares

ENERGY RATING
8.9 Stars

ENERGY ASSESSOR
Michael Blokland

BUSHFIRE ATTACK LEVEL
BAL-19

INSIGHTS

"We opted for a gas cooktop – run using bottled gas – because we didn't want to worry about not being able to cook if we got three days of rain and our off-grid solar system didn't generate much. We have about two days of energy autonomy in heavy cloud and rain."

Mark, homeowner