



Warmth from the winter sun heats the north-facing wintergarden during the day; at night an extractor fan distributes the warm air to the rest of the house ↓

European inspiration

A sun-filled wintergarden warms this colourful Victorian eco-home

By Fiona Negrin

Jan and Anne's family home in Queens Park is just 10 minutes drive from Geelong but it feels light years away. Light and airy, with lots of wood and flashes of primary colours, the house is tucked away above the Barwon River. It's an idyllic location but the site was a challenging one for the owners, who wanted a good-looking house with environmental sustainability the first priority. "You don't have to compromise on good design to do the environmental thing," says Jan. "We really looked at sustainability first, and then tried to make that look good; not the other way around."

Achieving a successful passive solar house

was the main difficulty, because the site is on a south-facing slope, making it harder to catch the winter sun and difficult to pour a traditional 'slab on ground' concrete floor. Concrete is an ideal material for thermal mass because – coupled with correct solar orientation – it stores and radiates the sun's heat in winter, and preserves the cool of the shade in summer.

To remedy the problem of the south-facing slope, a small cut was made into the slope to provide a level surface for a small concrete slab. The slab stores the sun's heat and maintains thermal stability in the house's open plan living area. An innovative, highly



Two 9500 litre rainwater tanks under the decking supply all the water needs of the house



insulated timber floor frame and screed slab was then created to provide thermal mass and regulate the climate in the main living areas. "There'd only be a handful of houses in Victoria which would have this," observes architect Mark Sanders, whose firm Third Ecology Architects designed the house.

Jan was born in Europe where the idea of a *wintergarten*, or indoor garden, is not uncommon. The *wintergarten* in Queens Park is a north-facing room that connects to the living area via double-glazed doors. Its ceiling and external walls are made from glass, and its floor forms part of the concrete slab, so it's a good collector of the sun's heat. In winter, heat is transferred from the *wintergarten*

to the rest of the house via a small 100w extractor fan. If it's extremely cold, the family use hydronic heating in the early morning until the passive heat from the *wintergarten* kicks in. **In summer, retractable awnings keep the sun out of the living areas; upper windows are thrown open for cross-ventilation at night; and an open back door lets in cool breezes from the Barwon River.**

In addition to the thermal mass afforded by the concrete slab, all windows are double glazed using high-performance, low-emissivity, argon gas-filled glazing, and higher than standard levels of insulation is in all floors, walls and ceilings to further reduce heat loss. The house was zoned so that the living

areas, which are the most used rooms, face north, and the bedrooms and bathrooms are located at the rear of the house. "The idea was to have a big, multi-functional loungeroom, and get away from the separation of lounge and dining areas," says Jan. The back section of the roof was created as a reverse pitch to the rest of the roof, so that it faces north and can accommodate a 2kw solar array and evacuated tube solar hot water system.

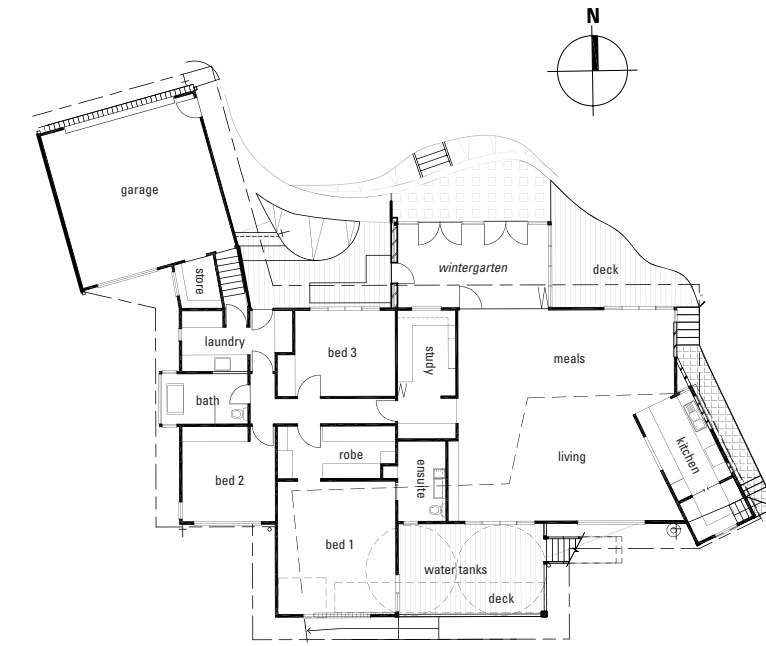
Jan and Anne aimed to be 100 per cent self-sufficient in their water supply and wastewater re-use, and they've succeeded. The roof collects rain water and feeds it to two 9500 litre tanks positioned discreetly below the rear veranda. These tanks



“We really looked at sustainability first, and then tried to make that look good; not the other way around”



The house was zoned so that the living areas, which are the most used rooms, face north, while the bedrooms and bathrooms are at the rear (southern) end of the house



Internal walls are clad with 'E0' standard plywood with low volatile organic compounds (VOC) content



“When it came time to make financial decisions about what would stay and what would go, the sustainability features were the bits that stayed”



provide water for the house and garden, including drinking water (after sterilisation in a colloidal silver filter). Jan also retro-fitted a 700 litre tank to collect 'first flush' rainwater and condensation off the roof. Mark Sanders says, "the onsite filtering and colloidal silver sterilising means that the water quality is as good or better than the mains water. However it is really important that people drinking rainwater, even after it's been filtered and sterilised, do not live in a place with polluted air."

Grey and black water is processed to Class B level in a vermiculture-based system, which then pumps the water into the garden at a sub-surface depth of

15 centimetres. This depth, combined with the use of raised garden beds, means that the family's food crop is not in danger of accidental contamination.

Jan concedes that not everybody wants to take water conservation to this level of dedication. "But there are other ways to conserve water," he observes. "Our showerheads are low-flow, we have a highly efficient washing machine and dishwasher, a low-flush toilet, we take short showers and we don't turn the taps on full flow. It's really about paying a bit of attention."

Timber is used prominently through the house for both sustainability and aesthetics. The floor,

wall and roof frames are made from plantation Radiata pine, and the veranda posts from Cypress macrocarpa. Untreated radially-sawn timbers from sustainably-managed forests clad the house, and 'E0' standard plywood (with low volatile organic compound content) is used for internal joinery and wall cladding. The floors and bench tops are made of recycled timber, and the front fence was built by a local artisan using old fence palings and railway sleeper off-cuts. Says Mark, "the fence is a creative and artistic reinvention of what we consider a fence to be – and it makes use of material that would otherwise end up in landfill".

Timbers were fitted together using screw connections rather than nailing or gluing; this makes for easy deconstruction when repairs are needed, instead of wasteful demolition.

All paints and finishes were kept to a minimum. The concrete floor was simply ground, polished and sealed with a water-based sealant. The door and window frames were painted using low-VOC, water-based paints to benefit the inhabitants and – in keeping with Jan and Anne's holistic philosophy of sustainability – so that tradespeople wouldn't inhale toxic fumes while they worked.

Mark Sanders praises Jan and Anne for their

uncompromising attitude to sustainability. "Clients who want to take on board the full range of sustainability issues are quite rare. With this house, when it came time to make financial decisions about what would stay and what would go, the sustainability features were the bits that stayed. And the final outcome – how comfy it is, how happy Jan and Anne are – is that the house actually works."

Asked to identify the most effective sustainability features of the house, Jan doesn't hesitate to name the passive design elements: "North orientation of living spaces, thermal mass and passive solar design, and cross-ventilation. If you use the initial



The fence is made from recycled fence palings and railway sleeper off-cuts, while the house is clad with untreated timber from sustainably-managed forests



design to make the house 'work' thermally, you'll reduce the need for artificial heating and cooling later. This house fully meets our expectations in terms of sustainability." With characteristic understatement he adds, "It's a comfortable house to live in. The top and bottom extremes of temperature have been taken out...the sun comes in and the light changes. It's a really nice place to be." ←

Designer: Third Ecology Architects (Mark Sanders) www.thirdecology.com.au

Builder: Daran Constructions

Location: Geelong, VIC

Photography: Neville Wright and Jan (owner)

Features:

- 2kW Origin Energy grid-connected photovoltaic system
- Apricus evacuated-tube gas boosted solar hot water
- 2 x 9600L rainwater tanks
- Bradford glass wool insulation in floors (R4.5) and ceilings/roof (R7)
- 'Triple blend' cement with up to 25% recycled concrete aggregate
- Low 'e', argon double glazing
- Hunter Douglas ceiling fans and motorised awning windows
- Brax flexible automated shade awnings
- Westaflex heat shifting fan system
- Biolytix wastewater treatment and reuse system
- Onsite waste streaming
- Clipsal Centameter power monitor
- E-zero joinery substrates
- Low VOC paints
- Water-based clear timber coatings
- Water supply filtered and sterilised by colloidal silver water filtration