

Contemporary cool



PHOTOS: STIRLING IMAGES

Nelson-based English architect Helen Richards has come up with a package for a stylish solar-heated healthy home that is affordable to build and live in.

1 HELEN RICHARDS' HOME IS BASED ON A **TEMPLATE** SHE HAS DESIGNED FOR **AFFORDABLE SOLAR-CONSCIOUS HOUSES**. SHE VARIED THE DESIGN WITH A CURVED FRONT WALL AND A **SUNKEN LOUNGE**. THE HOUSE IS ANGLED WITH **LIVING AREAS FACING THE SUN**.

2 THE **ROOF OVERHANG** IS SIZED TO KEEP OUT THE HOT **SUMMER SUN** WHILE ALLOWING IT TO PENETRATE DEEP INSIDE IN WINTER.

34 SUN POURS IN THROUGH THE FRONT WINDOWS AND STRIKES **POLISHED CONCRETE**, WHICH **STORES THE HEAT** TO RELEASE IT LATER.

THE DECK HAS SINCE HAD A BALUSTRADE BUILT.



If architect Helen Richards feels the need to switch on a heater on a crisp winter's night, she's putting her reputation on the line.

If her house is cold after a sunny Nelson day, it means her design hasn't worked. Happily, the house has been comfortably warm for the couple of months she has lived there so far.

She expects the temperature to remain constant at between 16°C and 21°C.

Richards' stylish contemporary home is her own demonstration house, built from the template she has developed for passive solar-designed homes.

Visitors can walk through and experience what it feels like, while noting the sunny aspect, double glazing and rooftop solar water heating.

Richards (33), a member of the Royal Institute of British Architects, aims to show eco-friendly architecture can be as much a source of aesthetic

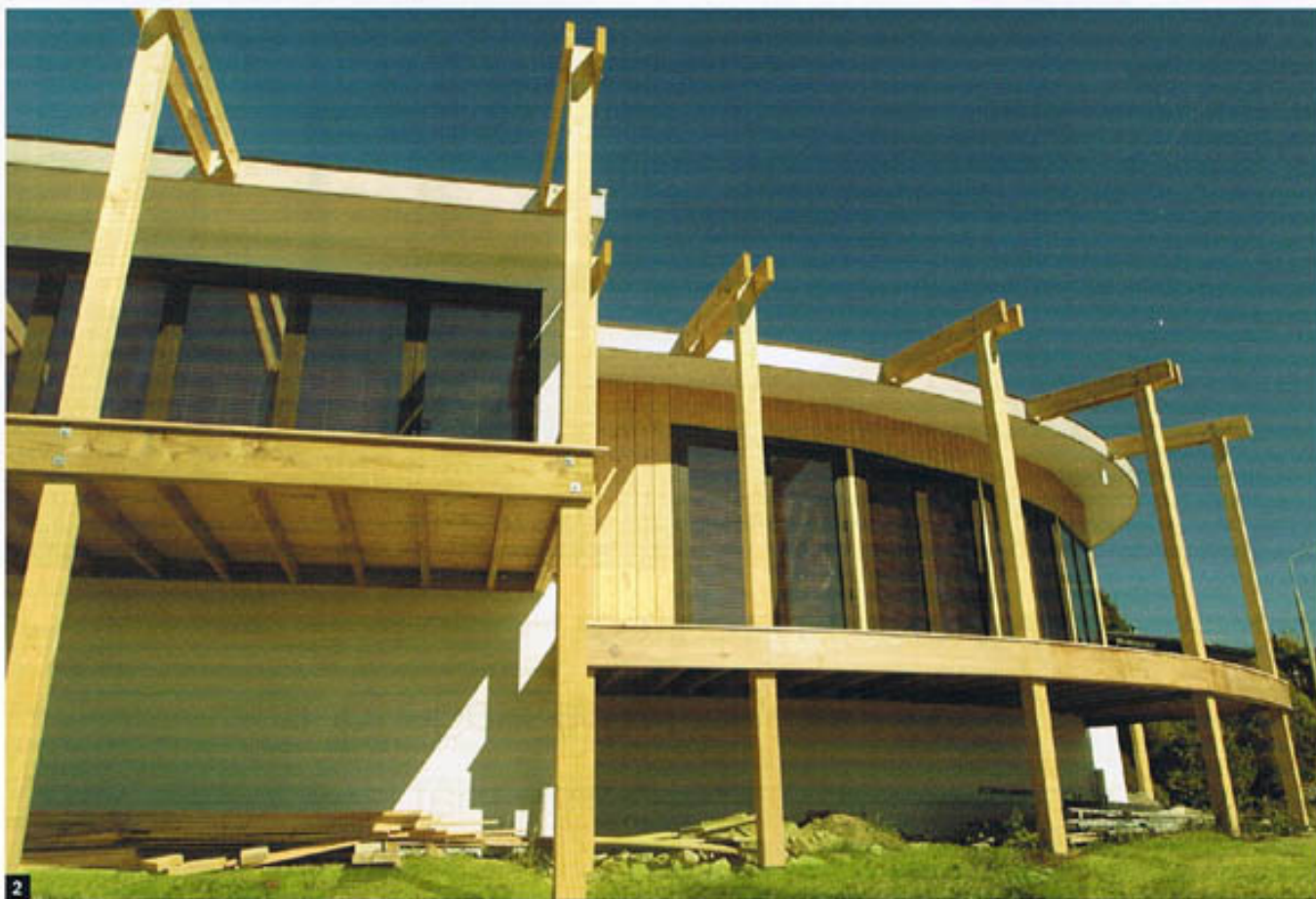
pleasure as any other architect-designed building.

She says some of her early visitors have been surprised by the house's clean modern lines and finishes – they were expecting a more ethnic look.

"People come in and look and say, 'oh, it's really modern'. But you can make it look any way you like.

I want to take this mainstream – it's not just about hippies and earth building."

Richards came to New Zealand as a tourist and





settled in Nelson. Arriving with fresh eyes, she saw a need for more energy-conscious design and a chance to make a difference in a country with scope to change the way houses are designed and built.

Her work arises from a deep conviction about reducing energy consumption and its associated greenhouse gas emissions. She was already interested in sustainable design and had studied it in her spare time while working in UK architectural

practices, but her exposure to New Zealand's natural environment has sharpened her enthusiasm.

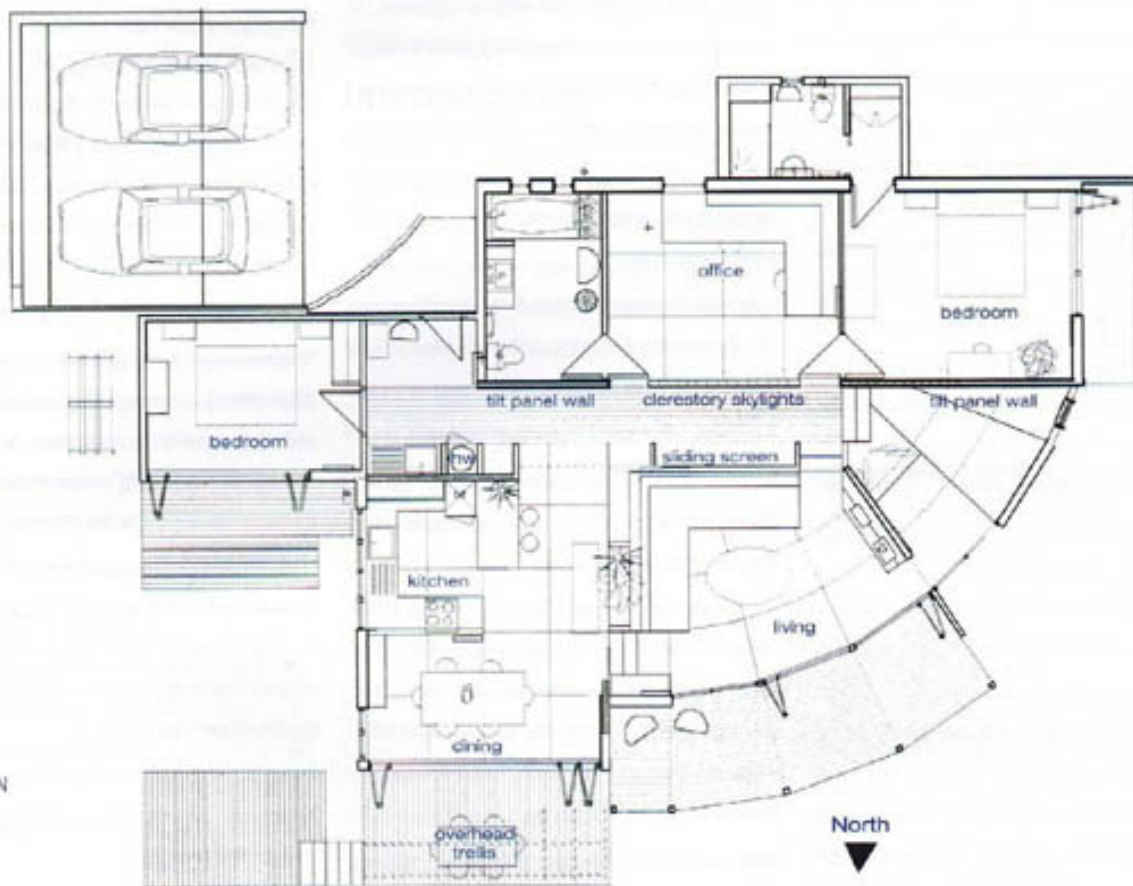
She feels New Zealand is a treasure worthy of care and protection. Through her solar home template, Richards hopes to make it easier for people who want a comfortable energy efficient home but find the prospect of extensive research and decision-making too daunting. "I've already done the hard work, so now I can share it with others," she says.

Energy store

A passive solar house uses materials made of heavy mass to collect, store and release the sun's heat. Energy management is built-in. There are no complicated controls to operate.

The heat storage material – in this case, concrete – keeps temperatures stable, avoiding wild extremes.

Richards' house is basically an insulated box with



FLOOR PLAN



► concrete inside the generous Woolbloc insulation as a temperature regulator. It is clad in a variety of materials, including Zinalume, plaster and Lawson cypress timber, on a timber frame.

Richards deviated from her template when she put a curve in the front wall and made the living area a couple of steps lower than the rear of the house.

Says Richards: "I did the template design, and when I did my one I adapted it with a curve on the front and a sunken lounge, but it's the same design to a format that can be replicated. You stick to the principles of passive solar."

Fortunately on her site the views are to the north, avoiding a potential conflict in choosing the best way to orient the house for the views and sun. For energy efficiency and comfort, it's best to have the largest windows on the northern side so the sun can come in and strike the heat-gathering material, and to have only small windows to the south. Large unshaded west-facing windows should also be avoided, because the low setting sun can overheat the house.

The house is 180 square metres in area, including a double garage, and built on an axis that runs from east to west to maximise exposure to the northern sun. Living areas and one bedroom are on the north side, while the other two bedrooms and both bathrooms are on the south. But vertical north-facing clerestory roof windows admit light to the rear and a central internal concrete wall absorbs heat during the day and releases it at night, keeping the back rooms warm.

The house rests on a pad of concrete that absorbs

heat from the sun. Insulation beneath the concrete prevents heat from draining into the ground.

Most of the areas of floor that catch the sun are left uncovered, because carpet inhibits its heat-absorbing properties.

Richards has been pleasantly surprised by the tobacco-coloured polished concrete floor's tactile appeal: "It feels like leather," she says.

Interior finishes reflect the exterior materials. A feature has been made of concrete polished to reveal its pebbly aggregate. The kitchen is stainless steel, softened by the warmth of nearby natural materials.

Worktops in the laundry and bathrooms are concrete lightened with titanium oxide – the pigment that makes paint white.

Solar water heating is from one Sola 60 rooftop panel of 1.25 metres by 4.8 metres, with a 225 litre medium pressure hot water cylinder inside.

A rainwater tank stores water from the roof.

Windows are thermally-broken aluminium framed double glazing that not only acts as an insulator but also eliminates condensation.

Energy was not the only consideration. The air in many new homes is an unhealthy soup as the paints, building materials and floor coverings release the solvents and preservatives included in their manufacture. Richards has selected low-toxicity finishes and materials.

Water conservation has energy impacts: it reduces the amount of pumping and processing at the town water supply plant and by minimising the amount of

5 A FROSTED GLASS WALL DELINEATES THE CORRIDOR WHILE ALLOWING LIGHT THROUGH, AND LEAVES GAPS TO CONNECT IT WITH THE REST OF THE HOUSE.

6 HELEN RICHARDS' OFFICE IS THE TEMPLATE HOUSE'S THIRD BEDROOM.

stormwater flooding into the sewerage system, it saves pump energy there too.

House package

Richards designed the house template house several years ago, aiming for energy efficiency and cost-effectiveness. "I wanted to put something on the market that was available at a lower price and saved energy." The concept has been patented and is subject to copyright. Richards has formed a company, Powered Living Ltd, to market it.

The next logical step was to design her own house. "The whole point was to generate interest. It's one thing to talk about it ..." she says. With clients an architect is under pressure to compromise – "and that's fair enough, they're paying" – but on her own house Richards was able to use the materials she wanted.

"I have a lot of demonstration materials here. People can see and feel how warm it is. It's looking at energy in a serious way. I get upset about a general misunderstanding (of passive solar design) – a lot of the information is incorrect."

Richards has gathered a team to supply landscaping, structural engineering, energy advice and construction services.

"It takes energy and time to figure it all out, and I've already done that. It's a load of extra information,

How much insulation?

Building element	Insulation	Richards house – insulation value	NZ Building Code for Nelson
Roof	Two layers of standard density 100 mm Woolbloc	R4	R2.1
Exterior walls	150 mm of standard density Woolbloc	R3.1	R1.5-1.7
Window glazing	Double glazing	R0.54	R0.18

To find out how to do a really good job of insulating a house, see *Insulation of Lightweight-framed and Solid-timber Houses*, SNZ PAS 4244:2003, from Standards New Zealand.

This provides specifications for 'code compliant', 'better' and 'best' insulation levels in houses of different construction types in various climate zones of the country.

It also gives some useful tips on building design principles, including aspects such as site selection, preliminary design, lighting and appliances.

It rates various types of windows for their thermal performance.

It complements NZS 4218:1996, which is an 'Acceptable Solution' to the energy efficiency requirements of the New Zealand Building Code.

stress and decision-making. I've got the information here and a demonstration model."

Keeping the cost down was a high priority. She estimates the cost would begin at \$80,000 and range from \$1500 to \$1800 a square metre, depending on size and design features, with around four to six months' construction time.

A group house construction company can build houses for around \$1300 per square metre, but individual architect-designed houses don't have the same economies of scale. And in pressure points like Nelson and Queenstown, market forces mean the costs rise. Says Richards: "Houses are easily \$2000 a square metre at the moment – there aren't enough builders to go round."

The Powered Living package includes consultation, site visit, initial advice and design ideas, price estimates, design development, preparation and approval of building consents, detailed construction drawings and construction. The basic design will remain consistent, but will be customised for individual clients.

Public response

Richards has opened her home to visits by the public, and local architect Ellen Brinkman organised an architects' tour. Says Richards: "I'm booked up with houses [to design] already till August-September, but this will generate interest from people I don't already know."

After speaking with BRANZ home energy researcher Albrecht Stoecklein, she has spent around \$1000

on dataloggers to keep track of the temperatures in various parts of the house. The data will be compared with outdoor temperatures to test the effectiveness of the house design.

And what's it like to live in? "Yesterday it was sunny but last night was cold [outside]. This morning the house felt lovely."

Asked if there was anything she would do differently, she says she would have placed her home office in a better position for the views.

Interest rising

Why does it take a young English architect to show New Zealanders how good their homes could be? Christchurch architect of UK origin, Roger Buck, has been plugging away for years on passive solar design. He says interest has definitely picked up, especially after the winter electricity scares of the last few years. "We're finding there's definitely a shift recently. There's a much better informed public, willing to push the limits and trust in us."

Buck says Richards is practising the discipline of her UK architectural training, in creating a design that can be replicated economically. "They are taught about using modules of a standard size, because there is so much mass production of houses over there. What she's doing is really commendable.

"The trick is to make good design affordable, with simple buildings that are cheap to build."

He says the leaky buildings issue has raised awareness of quality construction overall, and energy-wise design goes along with that. People immigrating

from Europe and the USA are demanding good design, especially in the South Island where winter has real bite: "There's a realisation that our Dickensian houses are not very comfortable."

Buck believes solar design principles are not more widely applied in New Zealand because, in the first place, very few houses are designed by architects, and those that are have owners who would rather make an architectural statement than think about energy use.

The other 90-odd per cent are built by group home developers. Buck says the way subdivisions are set up doesn't take solar access into account – houses are still built facing the street, so only a minority will get the optimum sun.

Buck believes it's the role of councils to set higher standards for subdivision design, and commends Waitakere City Council for showing what can be done.

More information

- See: www.poweredliving.co.nz
- Contact home@poweredliving.co.nz
- See Waitakere City Council's website for its Better Buildings Guide and other tips for sustainable building and living, www.waitakere.govt.nz
- See the Australian Greenhouse Office's website, www.greenhouse.gov.au, for sustainable home guide, Your Home
- Looking for a green architect? Contact the New Zealand Institute of Architects for a selection in your area, ph 09 623 6080