

A 'standard' solar house

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Nelson architect Helen Richards has built a solar 'show home' in Nelson, and has lived in it through the first winter without using any heating. The extreme internal temperature range was 16–24°C (and Richards should know: almost every room has a digital thermometer). The show house has a concrete floor 150 mm thick to provide thermal mass, some internal concrete walls, and even concrete benches in kitchen and bathroom. Double glazing and thick insulation minimise heat losses, with large windows on the north side to maximise solar heat gain in winter.

Richards has blended energy efficiency with style, to increase the mass appeal of a solar home. She says that people are often surprised at the house's good looks. The design is patented.

Technical information can be found in *EnergyWise News* (June 2004) and on the web site:
www.poweredliving.co.nz

We visited Helen Richards in January, hopefully as a first step in building a Powered Living house. We were impressed. The look, feel and comfort all seemed right at once, although it is unfortunate that the view across Golden Bay is not part of the standard package.

Points we noted included:

- The package is neither a standard spec-house nor a conventional architectural offering: much more flexible than a spec house but cheaper than a full architectural design. We were given a rough preliminary drawing, an adaptation of the smaller design on the web site, prepared for us. Studying it in detail when we got home showed that it is already close to what we want, and easily adjustable where needed. However, it will probably need adaptation to the site, when a site is chosen.
- Claddings and finishings can be the owner's choice.
- Recommended orientation is ideally within $\pm 15^\circ$ of true north but $\pm 30^\circ$ is acceptable.
- Some form of heating is recommended. Radiant is best — warm air may do something for you as it goes past, but then just warms the thermal mass and takes hours to make any other difference.
- The windows are double glazed and huge —

almost full-width and higher than standard. They might easily feel uncomfortable if the house were overlooked from the north.

- The design has north-side eaves to keep the summer sun out. There are no verandahs but this is a strength (solar gain) not a weakness: with bi-fold doors open, the space just inside them effectively is a verandah.
- Owner's temperature control is encouragingly casual. A clerestory window was slightly open, with no way of closing it from ground level. It had been like that all winter (remember that this is a prototype), but now a control has been fitted for summer cooling.
- A main spine wall, running E-W, is made of upended and (in the show house) polished concrete slabs, and forms part of the thermal mass of the house. Concrete surfaces can be finished as the owner wishes.

Finding a solar section

Our experience is that many sections are unsuitable for a solar house. We have had to search for something large (probably at least 700 m²) to reduce the risk of being built out, which would mean losing heating as well as outlook.

This is a general problem: typical District Plan protection is inadequate for a house designed to rely on passive solar heating. District Plans typically require a house to be inside a building line rising vertically to 2.0 m at a point 0–3 m inside the boundary line, and then sloping inwards at 45° (recession plane) to some specified maximum height. This gives little protection when the noon winter sun is only 26.5° above the horizon, and no protection against growing trees.

Molly Melhuish points out that the city of Boulder, Colorado, has addressed this problem (Boulder is in latitude 36°, compared with Auckland 37°, Dunedin 46°). Their guidelines are on the web at:

[http://www.ci.boulder.co.us/building services/guides/solrshad.pdf](http://www.ci.boulder.co.us/building_services/guides/solrshad.pdf)

Broadly, Boulder offer:

- A planning requirement for new houses to be built with their long axis E-W, with subdivisions laid out accordingly. There are additional requirements for sloping ground.
- General protection of a right to sun for a minimum of four hours (11.00–14.00) in mid-winter.
- Special protection for houses designed for solar gain, by issuing a 'solar access permit'.