Ask our experts

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Your design, product and specification questions answered by our expert columnists.

Katherine Madden is Associate Director of Pidcock Architecture. She has 17 years experience in architecture and design, and holds a Post Graduate Certificate in Sustainable Development and a TAFE qualification in Permaculture Design.
Dick Clarke is principal of Envirotecture, a sustainable building design firm in Sydney and Redland Bay, Queensland.

Q— *I have a passive solar house in the Lower Blue Mountains and I am tweaking the north side which has a wide pergola running the length of the house. There is a deciduous grapevine growing over the pergola to allow winter sun into the house through floor-to-ceiling windows and doors, and provide shade in the summer. Three 'landings' need to be installed outside the floor-to-ceiling doors and windows, and as we live in a bushfire zone (BAL40), the council has informed me that the only materials which can be used would be tiles/pavers on concrete or ModWood on steel bearers and joists. Which would be the better solution taking heat retention/reflection into account?*

Brendon, NSW

A— The most suitable structure will depend on the ground level. Concrete is better/cheaper if laid on the ground rather than suspended. ModWood on a steel structure would need a certain amount of clearance below it.

Concrete is high in thermal mass, which means it will retain heat for a longer period than wood or similar composite products. Depending on the orientation of these landings and the colour of the tile (darker colours retain more heat, lighter colours reflect more heat), some warmth underfoot in winter could be very welcome, but of course this would not benefit your inside spaces. In summer, the landings would need to be shaded to stop them overheating and reflecting heat back into your living space. ModWood would not get as hot underfoot as the concrete/tile option and you are less likely to get heat reflection.

While concrete is a durable material that lasts in difficult environments, such as bushfire zones, it also has a high embodied energy. ModWood has a much lower embodied energy, and contains a high percentage of recycled and waste materials. Given the impact of concrete and its heat retention properties, I would suggest a product like ModWood could be a better choice in this instance if there is sufficient clearance.

– Katherine

Q— *I am considering building a granny flat on my daughter's property at Byron Bay, but as I am in Canberra I can't do any of the work on it myself. I want it to be as green and low-cost as possible. I'd also like it to be suitable to rent out when it's completed, and for it to be low-maintenance, so I am considering a kit or modular home. I am wondering about the merits of steel compared to timber construction. Steel clearly uses more energy to produce, but it has a high recycled content. I understand timber is not always sustainably sourced. I'm also concerned about thermal bridging in operation.*

Caroline, Canberra

A— Steel made in Australia by Bluescope now has a significantly lower embodied energy thanks to the work of Professor Veena Sahajwalla and her team at UNSW. Nonetheless, it will always have a higher embodied energy than timber. Its thermal conductivity is one of the issues to be addressed in the design detailing.

Modular construction is an important pathway toward affordable, sustainable buildings. Steel is often used in modular construction for its simple connection strength in the handling and transport phases. Timber can do the same job, but there are extra steps in making the connections rigid, which ironically usually involve adding some steel connection systems. But steel also has the ability to create a lot of structure for a limited tonnage – a little goes a long way.

Creating thermal breaks to prevent each steel element acting as a heating and cooling fin is a challenge, but the current availability of materials to do that means it is not an obstacle. Isolating each stud or joist is one way, such as using individual patches or strips of dense foam such as Dow's Isoboard. This allows truly breathable membranes such as Bradford Proctorwrap to be used under vapour-porous sheet cladding. Weathertex's cavity fixing system also lends itself to this approach, which includes its own version of the breathable membrane made by Proctor.

Alternatively, a complete wall blanket of semi- or non-breathable material with foil skins over a soft foam core, like Aircell Permiwall or Insulbreak, will provide a thermal break sufficient for mild climates, and a head start on thermal insulation for the whole wall as well. The addition of 'standard' R2.0 or R2.5 wall batts increases the performance. But it should be noted that walls built this way will not breathe, and another strategy for controlling internal humidity is needed.

– Dick

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