

Material beauty

Floor and glazing upgrades



Dion and Amy Zappacosta's reno included some interesting material choices, including a raised timber floor rather than a concrete slab, recycled materials and eco-finishes. They describe how they went about it, and the results.



↑ Looking out to the backyard from the finished kitchen/living room, with the recycled timber benchtop.

BACK in 2013, our family of four was looking for a new home in Wollongong, NSW. One of our main criteria was that it be on a flat block, as our previous home was a pole house on a very steep block—not great for family living! We were also looking for a house where the kitchen faced the backyard, and the yard itself had the potential to be kid-friendly and accommodate a decent vegie garden and fruit trees.

The house we found wasn't ideal, but it had potential. A timber-framed weatherboard, around 80 years old, it was showing its age, but still retained some of the charm of its era.

There were lots of problems. It was suffering from some pretty average additions and modifications done in the 60s, including a filled-in section of the western verandah

and an unattractive bathroom/laundry fibro extension. The layout and thermal performance of the house wasn't great, as we found after living in it for 18 months. It was cold and draughty in winter, with only a sliver of winter sun landing on the kitchen bench. The high ceilings and steep pitched roof helped in the summer, but cross-ventilation was non-existent and most evenings were warm and clammy. The bedrooms and living room were a decent size, but the kitchen/dining space was very cramped. We knew we could work with it though.

The advantage of using an architect

From the outset we knew we wanted a bit more space and to improve the layout and remedy some of the dodgy alterations. We

had no intention of demolishing the original part of the house, and were looking to improve the kitchen, dining, bathroom and laundry, as well as add some living space. We also wanted to do it in a way that improved the thermal performance of the house and not have to sit at the breakfast table shivering in a dressing gown and slippers!

We talked to architects and draftspeople with a brief of wanting to make sustainable modifications which incorporated passive solar design. The choice to go with Andy Marlow from Envirotecure was easy. We developed a good rapport with him from the first meeting; being aligned in our views on sustainability and the environment was a great reference point for discussing the designs and materials Andy had in mind.

The architectural fees through to start of construction can be daunting at first, but we decided the value of having an architect on board far outweighed this. Andy found ways to include what we wanted on a smaller construction footprint, which reduced our costs significantly. The comfort the finished house provides is also superior to what we could have specified ourselves. The specification schedule and scope of works documents vastly simplified the builder engagement process and the build itself.

It took about five months for Andy to provide initial plans, which were developed from our initial brief and a site visit to walk through what we were envisioning. It took another five months to refine the plans and lodge for approval. After going through the process of finding the right builder and organising finance, construction commenced 12 months later in 2016.



↑ Insulation installation in walls and ceiling.



↑ The floor finished with Livos Koimos high solid oil.

Construction and material selection

The construction began with demolishing the existing kitchen and bathroom/laundry add-on. As well as adding on the new section at the rear, we replaced all existing windows and doors on the original house, insulated in the walls and under the floors, and reclad with Weathertex weatherboards.

All materials in the build were specified by Andy, which was part of the value for us of going with Envirotecure. We talked through all the materials and technologies specified to understand the benefits. Some items, such as double-glazed windows, were familiar to us, whereas phase change materials and foam insulation board were not.

We replaced all the windows in the old part of the house with timber-framed double-glazed units, some because they were in poor condition, with rotting timber, and others because they had poor quality aluminium frames. Andy specified timber frames for the new windows, both for thermal performance and aesthetics.

Some comments from Andy on the window/frame selection: "Timber's non-conductive properties avoid thermal bridging and minimise condensation risk." Andy decided against using low-e coatings: "The northern windows were optimally shaded so reducing solar gain through a coating on surface #2 (outer facing side on the inside pane) would have been counter-productive. The west-facing verandah doors are all well-shaded too, again reducing the need for glass coatings."

Timber floor with PCMs

Andy and Envirotecure are fans of using timber in residential building as "a renewable

resource that is also cost-effective". It was also more in keeping with the existing house.

In addition, for the floor structure, the site and existing home meant a suspended timber floor was most cost-effective. A concrete slab for the addition would have been costly due to its height above ground, but Envirotecure wanted to add thermal mass to assist in stabilising temperatures. They chose the BioPCM phase change product for this: "a lightweight product that can be easily added into the floor construction," says Andy. Insulation was added underneath the PCMs to ensure that the heat they store is radiated back to the people inside, not the ground. [*Ed note: see p. 49 for some discussion on using PCMs under floors.*]

In our first winter here last year, we could definitely feel the warmth in the late afternoon and early evening from the PCMs re-radiating. The insulation in the walls and double glazing assist in getting the most from the PCMs. In summer, our sliding doors are generally open all day and night so it's a bit hard to say what is happening. We wouldn't think the PCMs make it any less comfortable though.

Replacing the poor-performing aluminium windows in the children's south-facing bedrooms combined with the now-insulated walls has had a considerable positive impact in such spaces that receive no direct sun.

For rooms where there is no roof cavity, such as the main living area and skillion section, a combination of thin insulation batts and foam insulation board provides a layer of continuous insulation underneath the scissor trusses, with battens mounted on the foam board to affix the ceiling to. The taped

joints increase thermal performance while minimising air leakage into the roof space. Including the insulation properties of the Anticon blanket brings the overall R-value to over 6. The building is able to breathe through the vapour-permeable wall wraps, reducing the risks of interstitial condensation.

Andy specified zero-VOC paints and natural floor oils, which we were responsible for sourcing and applying. The floor oil choice was straightforward as Andy had specified Livos Koimos high solid floor oil. For the paints there were a few more zero-VOC options for us to review. In the end we selected Ecostyle paints based on ease of sourcing and cost.

We were responsible for sourcing the kitchen fitout, and we settled on a local kitchen joinery who quickly understood what we were after. After sighting an area of our house that featured eco-ply cladding, the kitchen designer incorporated some visible ply design detail into the cabinets and drawers. To finish off, they suggested a recycled timber benchtop from a local recycled timber joinery which makes a great centrepiece.

The results

We completed the redesign and moved back in in July 2017. We have only been through one bill cycle since then, so it's a bit hard to tell just yet what the impact has been. Our gas cooktop has been replaced with an induction unit, and we now have a heat pump for water heating. Accordingly, our electricity consumption increased by about 3kWh/day from the same period the previous year.

We retained a gas heater installed in the fireplace of the original building. We still used this at night last winter, but with the added



↑ The custom-made canvas cover attaches via stainless steel press studs to the underside of the clear roof of the deck to exclude summer sun; they take it down in winter.

insulation, it didn't need to be on for as long or as high a setting as prior to the renovation. It was also more effective as the heat travels through the house and is retained rather than leaking out through the walls and ceiling.

Compared to the previous year, our gas consumption dropped from 52MJ/day to zero over the November to January billing period and, in winter, when the heater was still required, our August to November consumption had dropped by two-thirds from 95MJ/day to 33MJ/day.

We haven't recorded any temperatures, but we can vouch that the comfort both in colder and warmer weather has been far superior to the old house. In winter, the insulation and draughtproofing cut down the chill, and the solar gain fills the house with warmth during the day. In summer, the insulation and cross-ventilation have made it very comfortable, and ceiling fans provide supplementary benefit at night.

We are very happy with how the build worked out. The layout and flow makes it very comfortable and draws many compliments from visitors. Neighbours are also appreciative that we retained the style of the original house rather than do a knockdown and rebuild. As the house was totally reclad, the appearance from the outside is consistent, whereas internally there is a distinction between the old and the new. We repainted the rooms in the original house when we painted the new section to give a consistent colour theme.

Some advice

The advice we would give to anyone else about to embark on a renovation is to spend at least a full year in the house first, to get a feeling for how you want the house to be changed.

When it comes to the build, find a builder who is happy to adhere to your architect's plans and specifications and is open-minded about using unfamiliar building products. You don't necessarily need a green builder. We found a builder who we got on with very well. They weren't specifically a green builder; we found that the green builders we contacted quoted a significant premium. It does help if you can come on-site regularly to see how things are progressing, ask questions and check that items such as insulation are done as intended before it is too late.

We did have one instance in which I had noticed that the builders had started to fix the wall wrap but had not installed the insulation batts. The builder was apologetic and they immediately rectified it. Luckily the wall cladding hadn't gone on yet as it would have been much more problematic and costly to the builder to fix! *

Amy and Dion Zappacosta live in the northern suburbs of Wollongong, with their two children Sofia, 9, and Rocco, 6. They have a passion for sustainability and always look for ways to recycle or upcycle what they can, of which their house is their masterpiece.

House specs:

- Passive solar design: large glass sliding doors face east and north for winter sun gain and main bedroom has north-facing windows. Summer sun excluded via deep eaves and an existing verandah to the west, plus a roll-up canvas blind on the east and temporary canvas shades on the underside of the clear deck roof, made to size by a local canvas cover business
- Cross-ventilation through large sliding doors on the east and north that pick up the north-easterlies on summer afternoons with exit through the front door and windows on the southern side. Cool south-easterly changes do the converse; French doors on the west pick up cool changes from the south-west, which exit through bedroom windows on the east and sliding doors to the north
- Windows: Airlite double-glazed windows (U-value of 3), using western red cedar
- Insulation: ceiling—Kingspan Kooltherm 25mm K10 foam board, Autex Greenstuff R4 polyester batts; underfloor—Kingspan Air Cell Permifloor; walls—Bradford Polymax 75mm R2 batts (existing stud walls) and Bradford Polymax 90mm R2.5 (new stud walls), plus Bradford ProctorWrap
- BioPCM installed under floorboards in living room and north-facing main bedroom, between battens fixed to subfloor, insulated underneath
- Weathertex weatherboards Primlok Smooth
- Floor treatment: Livos Koimos high solid floor oil, clear finish
- Paint: internal—Ecostyle zero-VOC paints, ceiling white, walls low-sheen white, bathroom/laundry satin white; external—Dulux White Box for cladding and Lexicon for trims
- Whittle wax wood coatings applied to Ecoply cladding in main room
- Hot water: Sanden 315L heat pump
- Cooktop: Miele KM6357 7.4kW induction
- Heating: Rinnai gas heater
- Fans: Artemis 58 with LED lights; Airfusion Climate II 50
- Rainwater: Colorbond Slimline 5000L.