Since Spring 2007 I have realised my mission was the quest for AFFORDABLE AND SUSTAINABLE HOUSING. Many of my fellow designers were on the 'eco' kick but none were really concerned it seemed, with bringing affordability to eco design - mostly quite the opposite in fact.

The Solabode Affordable Eco Home concept was born in 2008, 3 clients hopped on board with huge trust in my dreams and the 3rd Solabode home is nearing completion in Geraldine with two others finished in Golden Bay and the Moutere Hills. (see 3D rendering attached).

Many good lessons learnt, performance exceeded my expectations but cost did not, they were still too expensive at around $250k for a full build. So a new solution was needed!

Michael Reynolds Earthships have been a source of inspiration since late 2007 and indeed the Solabode home was a NZ vernacular version of those principles but mostly in areas of passive solar performance rather than material choice, though it did boast the use of natural materials like earth in adobe walls.

The Pozie concept (this award entry) takes all the lessons learned from the Solabode journey and adds a new major difference; It is made of up to 90% garbage in an attempt to reduce costs.

That's right, and that is the point and it aligns with the Garbage Warrior (Michael Reynolds) principles, to build with the common materials of this age, - garbage. In Earthships its tires and cans…

In Solabode Pozies (and later full houses) its wooden pallets for all framing, old wool carpet used Hessian side in and painted for lining, used polystyrene packaging material for insulation, demolition corrugated iron for roofing and cladding and odds and sods waste from mainstream building sites destined for landfill for things like soffit linings, insulation off cuts etc.

The Pozie is not just a stand alone cabin, built under 10m2 to avoid the need for a building consent, it is also a model house on a small scale to show how modest homes could be built using the same method.

As an architectural designer and Licensed Building Practitioner, I am very concerned with being responsible with my designs in that they must be structurally sound, durable, weather tight and energy efficient.

I developed a way of fixing pallets together in structural assemblies so they could be used as floor, wall and roof structural elements and strong enough to resist the maximum loads

that NZ houses can be designed to resist. This was because the portable Pozie could be potentially placed on any NZ site with unknown local conditions.

We load test every pallet assembly using mass to emulate force, adding heaps of safety margin, and measure differences in deflection between loaded and unloaded assemblies comparing those deflections with NZ standard guidelines (basically span/300).

All test deflections proved less than or within 'cooee' of this guideline deflection and none of the joints failed. (we could not even load them up to failure and the big deflections we got with huge loads returned to level after the load was removed).

Durability was a harder issue to solve or provide for as unpainted pine pallets that are used just once are not treated. I did not want to use treated wood for health and safety reasons so I had to find a way to prove that the untreated pine pallet structure could remain durable during the life of the building.

I was aware that untreated pine was used for timber framing in the mid 1990's as approved by NZS 3602 1995, the condition for use was that the timber be maintained at less than 18% moisture content as it would then be resistant to insect and fungal attack.

So I adopted a method of monitoring timber moisture content by installing terminals into the framing timber at all high risk locations within the building such as door and window sills, bottom plates and top plates. There are 8 MC terminals in the Pozie.

I invested in a precision moisture content meter and now regularly test the MC to see if it is below 18%. This morning the highest reading was 17.7% at one point with all the others between 13% and 15.5% and the building is still drying out.

We also put in a 'truth window' which allows inspection of the framing timber condition in the highest risk location, - below the window sill. If any water gets in here it will be easily seen.

I was very careful in my use of the demolition corrugated iron roofing and cladding and so used detailing straight out of the acceptable solution for weather tightness: E2/AS1, using flashings, flashing tapes, building wraps etc. Vertical corrugated cladding forms its own cavity system and is considered a low risk cladding.

The 450mm min roof overhang design was not for architectural appearances but to maintain a risk matrix score (in accordance with E2/AS1) in the very low range, again to maximise durability and minimise water ingress.

Energy efficiency is also paramount for health and safety, wool insulation off cuts from a new house building site was stuffed into the wall pallet cavities and discarded polystyrene packaging was stuffed tightly into roof and floor pallets with off cuts from Aircell foil backed bubble wrap was stapled under the floor as well. The doors and window are double glazed.

A few new materials were unavoidable, bolts, nails, screws and brackets as well as roof and window flashings and building wraps etc. The door and window joinery was new but not made of new material as I requested that the fabricator use up all the old scrap aluminium extrusions left over from other jobs.

Hence the multicoloured effect which the fabricator had a lot of fun with. External timber trim and fascia is heart macrocarpa decking but could easily have been pallet boards taken from some of the rainforest timber pallets that we found – which is naturally durable wood.

We did use this tropical wood for home made weatherboards above and below the window and for packers under the macrocarpa facings. The floor is 12mm untreated ply over the floor pallets because we ran out of time to make a 'Parquet' floor out of various rainforest pallet boards which would have been superior but costly in labour (which I was paying for by the hour...)

Internal battens covering the joints in the Hessian carpet wall and ceiling panels could also have been pallet boards but again time and money rules we made battens out of 12mm ply off cuts. The paint for the carpet inside walls came from a charity shop that was selling discarded paint. The visual effect is very ‘Japanese’.

The roof is also painted with Charity barn paint but I used new roof paint for the walls as I wanted a nice dark green that I couldn't find in the charity shop. The DIY choice is not so fussy but to 'sell' this concept I knew appearances had to be the first attractant.

I have invested $27,000 in this project to date, just to prove a point. The building itself cost about $16,000 with the rest in fixed costs, tooling and Ecofest costs. Transporting the Pozie to and from the workshop cost over $1000 alone.

Keep in mind that any prototype will be more costly than a mass produced product. Now while that maybe true I do not feel the need to prove the point as I am happy being the ideas man, not the business man... I am just trying to promote ways of building that are both truly sustainable and affordable for ordinary NZers.

The affordability may come however, in building a modest home using this system, rather than just a cabin, as there would be economies of scale. However the real saving would

come from DIY enthusiasts building their own home using these very cheap materials and methods.

I am exploring ways now to bring this knowledge to such people, The SHAC challenge is one of those ways, as is this competition, and there will be others like workshops and the DIY Manual with pull out plans - a wee project for my spare time (yeah right!).

The lost art of building ones own home is in dire need I believe of resurrection. My father built our family home with the help of a trained carpenter and many NZers have built the family bach (not the holiday McMansion) in days of old, often out of second hand materials.

An ever tightening regulatory building framework in modern times makes some builders wealthy but keeps most of us tied to the mortgage trap (or worse, trapped in rented homes).

It is time to empower those who have the desire and skills to build there own modest homes using materials that are found free or very cheap in all towns and cities - waste products from our commercialised industrialised society.

Waste product materials can take the place of yet more new products being made, thereby reducing the demand for more raw materials from mining and forest felling. This in turn reduces the use of fossil fuels for manufacture and transport, which then also reduces pollution from those same fossil fuel uses. And the clincher; less waste gets chucked into landfill, saving our soil and ground water from further pollution.

I have to admit that this whole idea is still flawed however because these materials are still a bi product of industrialised society and without that consumer machine ever churning, this solution would not be possible. The inherent irony...(sigh).

That said it is at least a message of reduction and of raising consciousness about such waste. It helps me to remember that the word 'waste' does not exist in nature, all by-products of one system are the nutrients for another system. Lets work towards aligning ourselves to that system - the ONLY sustainable system.

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