Case Study

3br home in Victoria

The (new) House that Graeme built.

If you're about to build a new home and are interested in the difference a cost efficient, sustainable home can make to your home running costs, then read on. This case study is just one of many who have spent that little bit more on the build and are now reaping the benefits. For the record it's a 2 adult household on 1.1 hectare of land in Gippsland, Victoria. Graeme talks about what they built, how they did it and what it costs to live in.

Overview:

The aim was to build a new energy efficient, sustainable house that we would eventually retire in. We wanted a house that would cost very little to heat or cool as well as blending into the environment. We also wanted something pretty low maintenance.

The Build:

Graeme designed the home himself. It has a lot of features built into the design that presented some "challenges" to the builder. The main features of the design are:

Orientation

The house is oriented with the main living areas facing true north (22 degrees west of magnetic north). Apart from the family room, there are no windows on the west and there is a small window in the formal dining room which faces east. All other windows face south (small windows) and north (large windows and doors)

Passive solar

The family room has 5 meters of glass windows and doors facing north with a tiled floor that acts as thermal mass. All windows and doors are timber framed single glazed.

Insulation

There is R3.5 insulation in the ceiling, R3.0 under the floor and R2.0 in the external walls. The insulation is polyester batts. All rooms (except the family room) are fitted with heavy curtains and "Euro-Track" pelmets. These are a pelmet with the curtain tracks integrated into it. It actually worked out cheaper to fit than traditional curtain tracks and separate pelmets. The summer heat is trapped behind the curtains and the winter heat is prevented from escaping through the windows.

Decking

There are 2 large decks on the north side both measuring 8m x 4m. The decking material used was "Modwood". It is recycled plastic and timber shavings extruded into a board. It is twice the price of Merbau but does not require any maintenance and will last in excess of 25 years.

Eaves

There are 600 mm eaves around the entire house with battens on the north side extending out to 1200mm. This stops the summer sun entering the house from mid November to mid March.

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Waste
Instead of a septic system (no sewerage) we fitted a worm farm. All the grey and black water from the house is fed into the farm. The solids stay on top and are consumed by the worms. The liquids (and vermicast) are fed into a holding tank where a pump then pumps it to a 200 square meter sub-surface irrigation field under the orchard. The trees are watered from beneath the soil. The cost was similar to a septic system with the additional benefit that it waters and feeds the orchard. We never need to fertilize.

Roof pitch
The roof has a pitch of 34 degrees which maximizes the angle for solar panels.

Water
There are 2 x 22,500 litre tanks attached to the house and the entire house runs from the tanks. Mains water is available but not used. The overflow from the tanks is fed into a dry river bed which in turn leads to the dam. No water falling on the house goes to waste.

Heating and cooling
Natural gas is not available and LPG or electric heating would be too expensive in the long run. There is not enough timber on the block to run a traditional wood fire. We opted for a pellet fire. This uses compressed pellets of sawdust as its fuel. It is a renewable energy source and the heater has an extremely efficient burn. It cost about the same as a traditional free-standing wood heater. The house does not have or need air-conditioning. There are ceiling fans in every room. The house is adequately cooled by using cross-flow ventilation.

Solar hot water
We have fitted a split system electric boost solar hot water unit to feed the entire house.

The Results:
The cost of the build was on a par with a normal good quality build. If anything it was cheaper because we did not build on a slab and we did not install central heating or air-conditioning.

The house performs brilliantly. The passive systems built into the house have really paid off. In winter, on a sunny day, the passive solar means that when it is 5 degrees outside it can be 26 degrees inside – without the heater being used. The insulation and thermal mass means that even though the sun will set at 5 p.m., we won't turn the heater on till around 7.30. The curtains and pelmets help to control the temperature very well.

The combination of wide eves to the north of the house and cross flow ventilation keeps the house 10 degrees cooler inside during summer.

The worm farm is fantastic. We had the best crop of pears and apples this year, without watering or fertilizing.

The house is regularly used as a holiday home (2-3 days a week on average) and we've never used more than 4 kWh per day. The electric boost for the solar hot water has been

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turned off for 5 years and has only turned on for approximately 5 days in that time. We have not had a water bill in 6 years.

To put this into context, with no gas bill, no water bills and little electricity, our total annual running cost for this house is $292. That's about $24.30 per month. (Cost based on electricity usage of 4kWh per day at cost of .20c per kWh, current rate at May 2011).

I call the house "The Swan" because it is white, elegant and under the surface it works hard to be sustainable. The house won a Master Builder's Award and a Housing Industry Association Award for best sustainable house in 2006. We have absolutely no doubt the extra effort to include sustainable features is well worth it and we'd recommend these considerations to anyone building.

We would like to thank Graeme and his family this case study. If you'd like to see more there's a short story available – see the news report at this link http://www.abc.net.au/local/audio/2009/09/10/2682345.htm

Some photos below.

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