Duplex home Armada St, Bayswater Western Australia

RENOVATION

The first duplex half was purchased in 1996 with a project in mind – to take a poorly designed project home and with a small budget turn it into a comfortable and environmentally friendly home. It took five years to plan the renovation with the help of the owners architect friend. The other half of the duplex was purchased the in 2001. This enabled the protection of a the large flooded gum in the backyard (a local plant to the area).

Energy Use – 6 units (kWh) a day in summer, 12 units a day in winter. The difference is due to the electric booster on our solar hot water system. Due to the huge gum tree out the back, many hours of sunlight for the system are lost in winter. The owners are signed up to Natural Power (renewable energy via the grid) with Synergy and that means that our household greenhouse gas emissions from our energy use are almost zero. A gas heater is used for very cold nights, and ceiling fans for cooling in summer. For lighting, natural lighting is used where possible, with light coloured walls and tiles and energy efficient lighting. Appliances have been bought with energy efficiency in mind, and there is only one medium size fridge.

Water Use – the household water use is around 330 litres a day (including watering a small area of lawn). Growing vegetables in summer, increases water use to around 800 litres a day. The toilet is flushed by rainwater for 8-9 months of the year. That saves around 40 litres a day. A water efficient shower head and front loading washing machine save water. Greywater from the shower and washing machine water fruit trees in the backyard.

Renovation completed in 2004

Garden – The entire block [about 400 m^2] was originally covered in lawn- now down to 50m^2, cut with a hand mower. This area includes a very efficient solar clothes dryer! The front garden is planted out with predominantly local native plants and these are not watered in summer. The rear garden is automatically reticulated with a drip system or subterranean irrigation system. The grey water from washing machine and shower/bath is fed by gravity into a subterranean trench system around the fruit trees. The owners grow vegetables from April to December without pesticides or herbicides, and have chickens to recycle kitchen scraps, reduce weeds and produce eggs. The chicken pen is moved around the yard as needed.

Passive Solar Design

Both sides of the duplex were a mirror image of each other. There was no connection between the indoor and outdoor areas. The living area and kitchen were dark. The laundry, toilet and bathroom and a small back verandah prevented warming winter sun entering our home. There is significant embodied energy in the brick and concrete structure that already existed and the owners wished to preserve this. The aim was to

capture as much north winter sun as possible given the north eastern aspect of the building. The easiest way to achieve this was to build out from the existing concrete slab (the stairs are the old stairs leading off the back verandah) and open up the room with a large bank of windows. It was important that the windows provide good cross ventilation, particularly at night. Louvres with security bars and insect mesh have been an excellent investment. Our deck provides us with a warm place to sit in winter and another living area.

Roof Window
The roof window has also been an excellent investment. It provides light in winter and allows hot air to escape on summer nights. It is double glazed and has a blind to protect it from summer sun.

Back Living Area
The polished concrete floor in this area is warmed by winter sun and this heat is then released at night. The concrete also has a cooling effect in summer. The windows are toned float glass, primarily designed to reduce solar heat gain and glare. The window towards the west has an awning to prevent sun hitting the glass in summer. External shading of windows reduces heat gains by 70-85%, whereas internal coverings can reduce heat gains by as little as 15%. Heat is lost through these windows in winter and the best window coverings for this area are under review (late 2007). The area is uncomfortable when the temperature falls below 5 degrees.

Flooring
Bamboo flooring was selected as a sustainable resource, with an aluminium oxide finish.

Bathroom/Laundry/Toilet
This was a particularly difficult area to renovate. The main aim was to put all of the wet areas in one place (reducing cleaning!), to provide some privacy for the toilet, and to maximise ventilation opportunities. In terms of plumbing, the rainwater tank was intended to flush the toilet and for water from the washing machine and shower/bath to be recycled as grey water for the garden.

All of this was acheived, but with problems along the way. The rainwater tank has continued to suffer water quality problems due to contamination of gutters from the gum tree next door. Rainwater collected from our 4000 Litre tank allows us to flush our toilet for around 9 months of the year, saving around 14,000 litres a year. Water from the shower and washing machine is sent into a settling tank and then gravity fed into trenches around fruit trees. The bathroom is well ventilated with both windows and an extraction fan over the shower. This is important to reduce levels of indoor pollution and helps with cleaning.

Further Information

A comprehensive list of renovation case studies is available at Your Home
http://www.greenhouse.gov.au/yourhome/technical/index.htm

A pleasant split level, well lit living room.

View from street entry

Adjoining duplex half showing only source of natural light to rear.

Original style of rear – typical 1960s home with bathroom to north.

Creative use of height – outdoor deck area, no re-location of bathroom needed.