

West Beacon Farm – The E-Skin

When the West Beacon Farm house was built in the 1950's energy was cheap and seemingly plentiful and little consideration was given to energy efficiency and insulation.



Over the last twenty years the same building has been fitted with numerous innovative energy creating and saving technologies, it accommodates solar thermal, solar PV, solar tracker PVs, two wind turbines, a ground source cooling system, a rainwater harvesting system, osmosis drinking water filtration, a combined heat and power unit and an electrolyser/fuel cell to store surplus electricity as hydrogen. One of the few things left to do was to superinsulate the house.

A thermal image of the building showed major heat losses particularly from the windows. The existing low quality timber frame windows housed low performance double glazing units, the windows were of varying sizes and shapes. The steel frame structure of the house had uninsulated rendered cavity block work, the roof was made of traditional Swithland slate.

The E-Skin

The 'e-skin' was designed using strawbales to insulate around the outside of the house whilst leaving the inside untouched. The strawbales provided double the insulation specified by building regulations standards and had the advantage of being both natural and cheap.

Challenges

There were challenges - the new external walls housing the strawbales protruded from below the existing fascia line and additional windows needed to be introduced to give maximum light, as the new depth of the walls would block some light from the existing windows. A further consideration was that the new e-skin was to accommodate the numerous existing services attached to the external walls, in particular the rainwater harvesting system.



Solutions

The new gutter design retained the original roof without intervention and an overhang was reinstated over the e-skin with a large gutter and edge detail. The house windows have been extensively modified, with additional windows added, and all existing windows replaced. The e-skin creates a combined quadruple glazing air gap between windows improving sound insulation and acts as a thermal buffer, an outward sloping soffit over the straw bales creates a light shelf.

All existing services including the rainwater harvesting system have been integrated and housed, creating a cleaner look.

Benefits

Additional benefits of the e-skin design were:

A new wood store has been created and the extra overhang creates shelter outside the front door. The need for maintenance of the window frames has been removed. Draught sealing has been incorporated throughout. A new small veranda has been added.

Results

At a very early stage there are interesting results – the feel of the house has been transformed. Within the first few days after completion, once the house had reached a stable temperature, heating was not needed.



Acknowledgements

The e-skin original design and concept was by Jerry Tseng of Pick Everard. Jerry has worked with Tony Marmont in the past designing his innovative helicopter hangar and the hydrogen fuel cell house, both at West Beacon Farm. Other credits go to Mark Windsor, Pick Everard, and building contractors G F Tomlinson, who started work in the snow and ended in warm spring sunshine. Work was completed in April 2009.