

BaleHaus by White Design Architects



BaleHaus - A domestic “carbon bank”

Living more sustainably requires us to develop ways to:

- live within our environmental means - especially in relation to our carbon footprint;
- maintain a healthy and comfortable quality of life;
- build strong communities.

A Lifetime of Low Carbon

The BaleHaus uses ModCell Straw cladding panels, to provide a super-insulated home, made from locally available materials that are designed to be dismantled, re-used and recycled at the end of a typical 75+ year life. This super insulating system meets the PassivHaus specification for zero heat homes.

A conventional house designed to today's Building Regulations will emit ca. 3.1 tonnes of CO₂ per year. The BaleHaus, however, reduces its heating demand by 80%. It does this through the super-insulation provided by ModCell, high performance triple glazing combined with airtight construction, passive design techniques and heat recovery ventilation in winter. A BioMass boiler combined with a solar domestic hot water system to each house supply the remaining heat requirement for water heating. Energy efficient electrical fittings and appliances in combination with passive design and good daylight levels reduce the electrical demand by 19%. These measures mean the Balehaus' carbon emissions are reduced to 1.6 tonnes per year, a saving of almost 50%.



A “Carbon Bank”

A reduction of 50% in carbon emissions from 2006 standards, while more than meeting an individual's personal Kyoto target (requiring a 60% reduction from 1990 levels by 2050) still doesn't meet the brief for a zero carbon house.

The BaleHaus has an additional feature however that allows it to become a carbon “bank”. Straw and timber are renewable resources that can provide a continuous renewable supply of building material, replacing high embodied energy (i.e. “CO₂ generating”) materials such as steel and concrete. As straw and timber grow they absorb CO₂ through photosynthesis, keep the carbon atom to make cellulose and give the oxygen atoms back to atmosphere. This is how we “bank” the carbon into the structure and fabric of each BaleHaus.

This process “banks” the equivalent of 130 tonnes of CO₂ per house to deliver a less than Zero Carbon Home before any one moves in. Even allowing for the ca 70 tonnes of CO₂ emitted during manufacture, supply and installation of the building fabric, structure, fixtures, fittings decoration mechanical and electrical equipment, this still leaves 60 tonnes of carbon in the “bank”.

This “carbon credit” is enough to offset 10 years of BaleHaus' energy requirements using fossil fuels



The supply of electrical energy to the Balehaus could alternatively be provided by approx 30sqm of photovoltaic panels on an individual building basis or by several buildings linked to a small on site wind turbine.

Alternatively, if the Balehaus was adopted over a larger site, biomass powered combined heat and power plant would become more economical, omitting the need for individual boilers in each house and at the same time providing the electrical energy.

Another option is for a large off-site wind turbine to provide the energy requirement for a similar scale of development. In these situations, the Balehaus has the potential to be Carbon Negative over its entire lifespan.

But we can do better still. We can help people reduce their electrical energy consumption even further. BaleHaus will be able to talk to the occupants using Smart metering. BaleHaus continuously feeds back information on power usage using wireless technology. This important information is available to residents in the kitchen, at their PC, on their TV, mobile phone and on a panel next to the front door. Smart metering enables people to see how much energy they are using and influences the choices they make about energy. The BRE has demonstrated that this can help people reduce energy usage by up to 30%. Often, we can be using energy without meaning to. For example, leaving phones, CD players, GameBoys, XBoxes, iPods HiFis, TVs etc either on standby or charging. A typical household is emitting 500kg of CO₂ a year through this unintended waste. BaleHaus has two ways of dealing with this. First, BaleHaus has an additional electrical circuit set to 12 volts for all of our small power items. Secondly, when you leave a BaleHaus there is a simple switch that turns off all but essential electrical use.



The Community and City Context

However this is only part of the story. A home is part of a wider social community and the impacts of living in our communities have greater implications for our CO₂ emissions than those associated with the construction and running of our homes. For example, for a standard 2002 regulations house, the impact of transport, food production and distribution total some 40% of CO₂ footprint (www.bioregional.com). A low carbon house therefore needs to promote the convenience of environmentally conscious living both in its design and its relationship to the district within which it is located.

Carbon emissions are reduced through the efficiencies of successful community projects such as car pools, transport schemes, heating systems, local food production and distribution schemes and waste processing. The BaleHaus has been developed with these factors in mind. In addition, the relationships and associations implied aim to provide convenient and lifestyle enhancing development as opposed to the general conception of low carbon living as restrictive and dull.

The principle encompasses housing, food, education, work, energy, transport and leisure. In this respect our proposals embody the principles of the One Planet Living (OPL) framework. A joint initiative of BioRegional and WWF, this recognises that our domestic carbon impact goes far beyond merely providing a low energy home. The aim is to produce stimulating and creative environments to live and work. Flexibility is designed in, enabling, for example, home work in a number of patterns, as well as adaptation over time in response to personal requirements.



BaleHaus has been developed to enable it to be arranged in terraces around a site perimeter. The houses protect an inner, semi-private courtyard creating a beneficial micro-climate for gardens and food production. Individual external access is provided to the courtyard without needing to enter the house. Walking and cycle paths run through the site, creating green routes that can link to parks within the urban grain, creating safe and pleasant routes and play spaces for children and adults. It is proposed that SUDS systems of swales and balancing ponds can be accommodated in these courts, further enhancing their biodiversity. The space allows for private or shared recycling and energy production.

It is important that each house has its own private outdoor space away from the community spaces. Each BaleHaus has two areas, a terrace at first floor and a roof terrace. These are designed to support green roofs and micro allotments. They also capture all of the rainwater that falls onto them for irrigating the planting and for flushing toilets. The roof can also accommodate solar hot water panels and PVs if required. They are also important social spaces where families can gather in the fresh air for low carbon barbecues in the summer or where parents can escape for the odd G&T while reading the newspapers.

BaleHaus delivers an entirely renewable way to construct homes, made from natural materials that are beautiful, affordable and sustainable. BaleHaus is a living, breathing home that is cool in summer and warm in winter. It is intelligent in design as well as operation and, at every turn, simply and effectively helps people reduce their CO₂ emissions without compromising how they choose to live their lives. For some people, "Less is a Bore", BaleHaus ensures that "Less is truly More" by delivering homes and communities that are safe, secure, vibrant, environmentally friendly and enhance our health, well being and happiness..