Sustainability – the Baufritz way

Oliver Rehm, UK managing director of Baufritz, discusses how the company is looking to a more sustainable future

Sustainability has been a buzzword for a number of years but has often been used as a sort of 'green wash' slopped rather superficially onto anything purporting to be environmentally friendly. Finally it is being redefined more holistically to encompass not just energy efficiency but also wider environmental issues such as minimising CO_2 emissions during the manufacture of a building. Something is not sustainable simply if it has a PV cell on it or triple glazing. The government, in pushing sustainability to the forefront of the agenda, has understood a root and branch approach is required, one that looks at how sustainable a building is from inception to disposal.

A European leader

Baufritz has always been a pioneer in the field of sustainable construction and welcomes working with the government and all those interested in putting the environment and the health of the building's occupants first. Since 1896, the company has been perfecting a timber-based building system that actively protects the environment. In 2009 Baufritz was awarded the title of 'Germany's most sustainable company'.

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For the last decade we have been exporting our ecofriendly homes to the UK and other European markets. Each home is individually designed by architects and is built with traditional timber construction methods in the Allgau, in southern Germany, but using the latest precision technology as you might expect from a German firm.

The off-site production of the building elements was described by Kevin McCloud in a feature on one of the houses for the Grand Designs TV series, as 'house building heaven'. The shell of the house, consisting of prefabricated walls, floors and roof panels is erected on site in a few days and the fit-out finished in the ensuing months, resulting in a build time of approximately three to four months. A reduced build time in the factory and on site drastically cuts energy requirements, an important part of an holistic approach to sustainability, but other issues also need to be addressed, such as pollution control, choice of materials and social aspects such as the occupants' health. In this article we will explore each of these areas in more detail to build up a complete picture of what it means to be truly sustainable.

Energy efficiency: off-site manufacture

All of Baufritz's buildings are off-site manufactured in a state-of-the-art factory and transported from there all over Europe. Constructing off site has massive advantages over conventional on site builds when it comes to sustainability.

Firstly, Baufritz can control its power source. Baufritz does not use nuclear power and since 2008 only energy from renewable sources has been used to power our factory, show houses and office buildings. The majority of the power required is produced by our own PV installation providing 420kW, which saves around 248 tonnes of CO_2 per year, or approximately 0.3kg of nuclear waste. Since 2005 (until the end of 2011) we have produced 2.03 million kWh of electricity. This saved 1,200 tonnes of CO_2 or 1.5kg of nuclear waste.

Secondly, Baufritz uses only natural building materials, mainly PEFC certified timber from the region near the manufacturing plant, and natural gypsum. The processing and construction of the prefabricated building components requires only low amounts of primary energy.

Thirdly, Baufritz ensures best use of material thanks to our using the latest manufacturing machinery. The optimised use of materials also minimises waste as multiple projects can be undertaken at once in the factory and timber only used as necessary or pieces shared between projects, ensuring no off cuts.

What are the buildings made of and why?

Wood is simply a wonderful natural material; its warmth, smell and texture, all contribute to producing something which many of us want to have in our homes, be it simply as a piece of furniture. Just imagine how all these qualities are amplified when on a grand scale you build a whole house of timber.

However, wood is not only a natural choice for its aesthetic qualities. Sustainable logging and reforestation make timber a material that exists in sufficient amounts and does not create emission and waste problems. Timber houses store CO_2 instead of

emitting it. In contrast the production of concrete, brick and polysterol all lead to enormous amounts of CO_2 emissions. The low level of embodied energy (energy required for production of raw material, manufacture and transport) makes it unrivalled. Baufritz uses on average 6,000 tonnes of wood to provide the timber for its homes, all of which is tested for toxins and radioactivity.

Off-site, in the highly optimised factory, all the major elements for the buildings are constructed and installed. External walls are finished with windows and doors in place and painted as necessary, as are all internal walls. Cladding is inserted, as are pipes and electrical installations. Roof elements and floor elements are also finished in the protected and efficient setting of the factory.

Being fabricated in a dry protected environment with high levels of testing and quality control minimises delays, which in turn ensures significantly less energy is required than with a conventional build. For example, there are simply no delays due to the weather – a common problem when building outside in the UK.

When the components are transported to site, elements are brought in as four or five loads, and these are the sole site transportations, drastically different to the usual to and fro of many vehicles over a number of months on traditional building sites. Therefore, prefabricating to the highest level so that only a couple of deliveries are necessary really is best for an international company like Baufritz, interested in minimising their carbon footprint.

Naturally this reduction of vehicular movement also decreases CO_2 emissions on site significantly. Furthermore, as construction is optimised and finished on site there are no numerous visits to the waste disposal centre.

Baufritz healthy homes are made of natural, environmentally friendly and reusable materials and are almost completely recyclable. A total of 57% of all waste produce in Germany comes from construction and demolition including special waste like insulation material and chemical adhesives which are very difficult and expensive to dispose of. Baufritz homes do not cause any disposal costs as they are almost completely recyclable.

The Baufritz passive house

Baufritz offers energy efficient houses, passive houses and energy plus houses.

The passive house is the gold standard aspired to in the building industry. It is a house which requires little to no energy for the heating of the home as the house efficiently stores the heat generated by the occupants and the technology existent in the home. Of course to achieve this standard through artificial means – such as the use of synthetic materials – is comparatively easy, but the real aim should be to reach this standard through the sole use of natural materials.

A conventional new build smells new due to the toxic emissions of the building materials used. Wall paint, adhesives, insulation materials etc emit 10,000-15,000Ug/m^3 of pollutants far more than the German Ministry of the Environment and other institutes consider acceptable. Baufritz uses solvent free wall paint which is certified by Nature Plus. Windows and doors are installed without the use of toxic building foams PU (Polyurethan) which contain MDI (Diphenylmethandisocyanat) and which are suspected of being carcinogenic.

Baufritz provides a free and individual air emission test for every building after completion of the building shell, with a laboratory analysis and certificate. Baufritz has carried out more than 700 emission tests to date and can guarantee a healthy home.

To insulate our homes and ensure they reach the passive house standard we use our own pioneering, award winning natural insulation: HOIZ which are wood shavings treated with two natural additives, whey and soda, to render them fire retardant and fungus proof. Wood is a 100% natural and renewable material. This simple but very efficient material guarantees a healthy and chemical-free interior climate. Wood shavings can regulate humidity levels naturally, absorbing moisture from the air and releasing it again if required, no other natural insulation material can do this.

Advantages of a Baufritz passive house in comparison to a standard passive house at a glance:

- Exclusive use of renewable energy during the production of the house in the factory;
- Low primary energy consumption due to sole use of natural building materials;
- Low CO_2 emissions during manufacturing due to low energy consumption and use of natural materials. Baufritz issues CO_2 balance for every building. The average building stores 40 tonnes of CO_2;
- Thermal insulation is made of natural materials rather than chemical;
- Phase shift: HOIZ is very effective against summer heat *versus* conventional insulation materials are only partly able to do this;
- Interior climate: humidity regulated construction;
- VOC and CO_2 controlled ventilation system;
- Air quality pollution: Baufritz only uses emission tested materials and carries out air quality tests;
- Building biology health check: Baufritz issues health pass for building confirming excellent health factor *versus* no health check;
- Electro smog protection: Baufritz installs electro smog protection as a standard *versus* it not being installed; and
- Disposal of building materials: almost all materials used can be returned to Nature (special waste).

Cradle to cradle gold award

Safeguarding the health of our clients has resulted in us being the world's first construction company which applies a cradle to

Signs of a sustainable home:

- Consist of natural and renewable building materials;
- Materials can be reused and recycled;
- Building materials are local to manufacturing plant;
- Materials require low energy for processing and are durable;
- Materials are not harmful to people;
- Energy for processing/manufacturing comes from renewable sources and have no negative impact on environment;
- Resourceful use of materials during design and manufacturing, optimised use to avoid waste;
- Waste to be reused, recyclable or biodegradable;
- Building elements can be easily transported and constructed to reduce energy required;
- Resourceful component design to reduce energy needed to construct;
- Compact house designs to reduce energy to construct;
- Compact designs to reduce energy to run it;
- Energy to come from renewable sources;
- Building can be easily maintained and is durable; and
- Building is flexible and can be altered easily or upgraded.

cradle certified ecological thermal insulation and to be accredited with a gold standard.

The certification was carried out by EPEA Ltd, on behalf of the Innovation Institute for cradle to cradle products and they awarded Baufritz gold – the second highest award, in the three categories of energy, water and social responsibility and the highest award – platinum – in the categories of material and material recycling.

The cradle to cradle approach is to consider the production process as a complete cycle. Products are manufactured using completely natural raw materials or renewable energy thus causing minimal CO_2 emissions. Cradle to cradle products can be recycled easily and re-enter the natural cycle, for example as compost. Instead of dealing with the problems created by our industrialised, throw-away society: CO_2 pollution, hazardous waste, this approach prevents these problems before they even start. HOIZ, our natural insulation, achieved the gold standard as it is completely biodegradable and therefore environmentally friendly whilst being a super insulating material which keeps our homes extremely energy efficient. The insulation is just a part of what we do but it is a perfect example of the two driving forces behind the Baufritz philosophy at work: ecofriendly and energy efficient.

Electro smog

As part of our vision, to provide customers with a totally healthy home – inside and out – we screen the house's occupants from harmful electro smog. Electro smog is caused by high frequency waves from mobile power masts, mobile phones, radio transmitters, radars and electrical fields from power lines. The 'Naila study' from 2004 confirmed a direct relationship between radiation and cases of illness. It confirmed that the likelihood of cancer is higher if you live closer to a mobile phone mast. In 2011 the World Health Organization rated mobile phone radiation as potentially carcinogenic.

Baufritz is committed to research; we have our own idea centre and building biologists whose job it is to think creatively, with the latest facts and technology, to develop products which can protect the health of our clients and the planet. As a result of this continuous research we developed the groundbreaking XandE board which we have installed as a standard in our buildings since 1999. This board shields the house from 98% of external electromagnetic radiation.

In addition we also demagnetise all steel beams before they are installed in the building. Magnetised steel elements disturb the natural Earth magnetic field and can have a negative effect on the human body, increasing muscular pains and tension.

Because each building is so completely toxin free and actively protects the inhabitants, we are able to issue a 'health certificate' for the building which confirms the tests which have been undertaken and the results such as the survey data of the air emission test of the shell and interior of the house. Thus our clients have complete peace of mind that their home is truly healthy. For some people, of course, this is merely an attractive bonus which can be used as a USP when they come to market their home. However, for those who have an allergy or other health complaint, such standards and tests are critical. Baufritz was one of the first European construction companies to be awarded with the Allokh allergy seal because we tailor make each house to the requirements of people suffering from allergies, reducing pollutants to an acceptable level.

BAUFRITZ
Der Ökohaus-Pionier seit 1896

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