

Should I build a sustainable home?

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This is the first in a series of brief guides designed to help first time self-builders navigate through the enormous amount of information available and help them achieve their goals for sustainable construction. Our aim is to answer some of the questions that are not often answered about sustainability by the many sites and forums out there.

These guides are for anyone, new to construction, embarking on a sustainable building project. It's based on my personal experience of building a certified Passivhaus family home and 14 years of being a running a eco building company.

What is a sustainable home?



A truly sustainable home would be one that is constructed from renewable materials that do not damage the environment and that operates with little or no impact on the environment. It would be in or near a town/city to minimise travel and would manage rain and waste water to reduce impact on sewers, etc.

Sustainability is not all about materials though, the design is very important. Buildings need to be adaptable so that the needs of future occupants can be accommodated. The design needs to be robust so that surface finishes and critical areas are not pushed to the limits, reducing the lifespan of the building. We've all seen buildings which look architecturally fantastic but age rapidly and require high levels of maintenance.

At the end of the life of the building the materials would be either re-useable, recyclable or biodegradable so that we don't fill up landfill sites and pollute the environment. This is how cheap-to-the-purchaser building materials become expensive-to-the-rest-of-us in the longer term.

However, it is useful to take a pragmatic view on what can be achieved with as little impact as possible within a constrained budget. Above ground it is relatively easy to focus on the floors, walls and roofs of buildings, using low carbon materials with very long lifespans, which are re-useable, recyclable or biodegradable. Below ground it is difficult to beat concrete and polystyrene to provide an economic, long lasting solution to foundations and insulation.

What are the benefits of building a sustainable home?



The most immediate benefits are of course financial. The reduction in energy usage has an obvious knock on to reduction in monthly outgoings for heating, lighting, etc. In many cases these are enormously reduced by anything up to 95% over the current average UK house. Improved water efficiency is another benefit as this reduces bills again.

Reducing energy demand/consumption also improves our energy security making us less reliant at any particular time. Energy security describes our susceptibility to the variations in the supply and cost of energy, whether from national or international sources.

There are other, more subtle benefits that are less easy to put a price tag on, comfort being one of them. Having a home which is designed and constructed well and insulated properly ensures a much more stable, warmer environment, keeping occupants more healthy and long living which beneficial to us all. People feel better psychologically and are happier being in a warm fresh environment which again has knock on effects.

Finally, but equally as importantly, sustainable homes reduce our impact on the environment. The materials used to build them are less or non-polluting and the energy required to run them is minimised. There is a certain satisfaction in knowing that you are reducing your impact on the environment, not wasting resources for future generations and the legacy that you leave is a benefit not a detriment.

How much money will I save on running costs?



Photo courtesy of 401kcalculator.org.

In the UK the average 85m² home spends almost £600 a year on heating and around £1350 on energy as a whole. It may seem incredible but reducing your heating bill to the cost of a cup of tea per day is entirely possible, saving many hundreds, even thousands of pounds per year for many.

Some Passivhaus buildings cost around 14p per m² per year to heat which would equate to £11.90 in an 86m² home, something that is to be dreamed of by owners of the average house in the UK.

In addition to this reduction in heating, use of rainwater or even grey water can reduce the cost of water bills, Solar thermal panels can reduce water heating costs and PV can help reduce electricity costs.

Beyond this it is down to the appliances and systems used within the building which determine energy consumption. If you're building a sustainable house then it also needs low energy appliances and fittings.

Should I build a Passivhaus?



The real decision is whether you feel the additional expense, normally around 8-10% of the build cost, is worth it to have the most comfortable house you'll ever own that requires virtually no heating.

Passivhaus is a very high building standard that ensures that (assuming you behave like most people) you'll use less than 15kWh of heat energy per m² of habitable space (e.g. not including space under cupboards/units, etc.) in the Passivhaus building.

The Passivhaus assessment tool (Passivhaus Planning Package, PHPP) assesses the design of the building to check whether it will meet the energy consumption requirements which instantly flags up problems with the design or construction methods before you get anywhere near a building site.

Once your design meets the energy requirements you simply have to build it. Many builders are fearful of building to this standard because it requires them to not only document the construction of many parts of the building but it also requires a fairly rigorous air tightness test. In reality, with a good design and diligent, thoughtful construction it is not difficult to meet the requirements and there are many new Passivhaus schemes under construction all the time.

For first timers one of the easiest ways to build to this standard is with timber frame and wood fibre insulation, using OSB on the inner face as the airtightness and vapour control layers. This can be air-tested at a very early stage and any leakages stopped well before anything is covered or un-reachable.

It is perfectly possible to use masonry to construct a Passivhaus building (the standard does not dictate what type of material should be used) but the internal plaster is normally used for the airtightness layer and once the walls are plastered any air leaks can be much more difficult to fix.



Finally, the Passivhaus standard can help you to create buildings which are wonderfully sustainable in their running but it does not address the energy used to create the building in the first place. It is still up to you to use materials which are sustainably sourced and produced if you want to create a truly sustainable home.

What's next?

Did you find the guide useful? If so and you'd like to stay up-to-date with Chris' latest resources and the next guide in this Self-Build Series, check out the [Back To Earth Supplies](#) website and sign up to the newsletter.