

Hockerton House Performance Standard

Background

The UK is facing a crisis in housing which requires a dramatic change in how houses are designed and built to achieve the carbon reductions necessary to meet our climate change targets. With this in mind Hockerton Housing Project is proposing standards of construction to inspire people to construct very high-performance houses. It must always be remembered that the lifestyle of the people living in the houses will affect emissions of carbon significantly. However, a well-engineered house and designed community space will help inspire them to reduce their carbon emissions.

In order to facilitate the development of sustainable, very low energy houses and lifestyles a series of standards are presented below, the “Hockerton House Performance Standards”. The hope is that these will encourage designers, builders and developers to achieve the performance to meet the climate emergency challenge we all face.

The standards are performance based to allow individual designers and builders to create their own solutions. This should encourage creativity and enable future solutions to be incorporated in the finished houses.

These performance standards have been inspired by Dr Robert Vale, Professor Brenda Vale, Nick Martin and the practical experience of the members of Hockerton Housing Project. They have drawn on General Information Report 53 produced for the Department of Environment Transport and the Regions by the Building Research Energy Conservation Support Unit.

The Hockerton House Performance Standards

There are five defined standards:

1. Hockerton-Zero,
2. Hockerton-Heat,
3. Hockerton-Embodied
4. Hockerton-Water,
5. Hockerton-Community

Definitions of the Standards

Hockerton-Zero

The Hockerton-Zero standard house creates no net emissions of carbon dioxide on an annual basis while meeting its energy needs. It must generate its own renewable electricity onsite sufficient to meet its electrical energy use. This as a net figure over a year. It will obtain its space heating requirement from renewable energy sources which may come from offsite.

If the house makes use of any non-renewable energy source it must compensate for this. In this case it must have its own renewable energy system of sufficient capacity so that during any year it can export enough renewable energy to compensate for the carbon emissions associated with the non-renewable energy.

Hockerton-Heat

The Hockerton-heat house meets Hockerton-Zero standard and normally obtains all its space heating needs from its occupants and their activities, combined with solar and casual heat gains. This means there would be no need for multi room heating systems. Because the input energy relies on occupancy the performance assumes the house is occupied by its designated number of residents based on provided bed space. It also assumes low energy appliances are used throughout the house. It recognises that a heated towel rail in the bathroom is required to dry towels.

To achieve this performance, careful attention will need to be given to insulation, air tightness and supplying appropriate ventilation to the house. Typical U values for the roof will be 0.06, walls 0.11, floor 0.11 and windows 1.0 W/m²K or better but specific designs may need to vary these to obtain the required performance. Due to the variable nature of passive energy supplies and the need for the steady supply of heat in the UK winter, heat storage will be needed, typically in the form of thermal mass. Thermal buffer zones are also typical.

The Hockerton-Heat house may have supplementary heating to cope with the supply of higher temperatures or heat demands associated with for example babies, the elderly or disabled occupants, under occupancy, illness and periods of extreme weather. This would be supplied from for example a small electric room heater and its use included in the net zero calculation.

Hockerton-Embodied

The Hockerton-embodied standard requires all the materials used to build the dwelling, its onsite services infrastructure and construction energy including transport to have their embodied carbon to be zero or if it is not zero to have this carbon offset before the completion of the project such that the net carbon impact from the development is zero.

This is an aspirational standard and was not fully achieved by Hockerton Housing Project initially. The trees planted took time to grow. In 2021 it is still difficult to achieve as the supply chains for building materials are typically not carbon neutral. The challenge is to find solutions to this.

Hockerton-Water

The Hockerton-Water house has separate parts: 1 Autonomous for Non-potable water, 2 Autonomous for water treatment and 3 Autonomous for all water use. This standard or any part of it could be achieved independently of the other standards, however the purpose of the Hockerton standards is primarily to achieve zero carbon housing and therefore at least standard Hockerton-Zero should be met.

Autonomous for Non-potable water means it must collect and store sufficient rainwater to meet its typical non-potable water needs. Autonomous for water treatment means it must process its own wastewater and sewage within the confines of the site. No dirty wastewater or sewage discharge of any kind must leave the curtilage of the site. Autonomous for all water means it must provide its entire potable, non-potable and treatment services from the resources it can collect and use from its site without the need for mains water or sewage connection.

Hockerton-Community

To achieve the Hockerton-Community standard the developer must engage with the potential purchasers and give them meaningful input into the design process. The developer must also engage with the existing local community, such as the Parish Council, to facilitate their input into the design process. There must be monitoring of performance for at least a year and after one year's occupancy this data should be made public but anonymised and comply to data protection laws to allow future improvements in new designs.

Any one or more of the above Hockerton standards should be achieved for each house in the community as long as the Hockerton-zero standard is achieved as a minimum.

The Hockerton-community standard should aspire to create a sustainable, vibrant, healthy space for people to live in while encouraging the reduction of residents' entire carbon impact. We cannot control individual behaviour however a well-designed community space can influence this by facilitating the elements described below.

This multiple house development will facilitate active transport such as walking and cycling. It will enable use of electric vehicles or other zero carbon fuel vehicles and supply these with zero carbon fuel.

It will facilitate local food growing, local working, biodiversity, waste reduction, recycling and healthy lifestyles. It will create social and legal structures and mechanisms to allow local people to manage local resources. These will also enable good integration into the surrounding local community.

The Hockerton-community will also reduce flood risk.

Note

It is likely that all houses will need to meet these standards by 2050 at the latest if we are to limit global warming. To keep global warming below 1.5 degrees, as required by the IPCC, these standards will have to be met well before 2050. Any houses built to lower standards between now and then will inevitably have to be retrofitted, costing time and money that we can ill afford. Housing can shoulder the burden of carbon reduction more easily than some sectors so fast implantation of these standards should be seen as a priority.

Written 20th April 2021 by Simon Tilley

For and on behalf of Hockerton Housing Project Trading Ltd

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Where "carbon" is used in these standards read greenhouse gas emissions in CO₂ equivalents.

References: BRECSU, 1998. Building a sustainable future: homes for an autonomous community. General Information Report 53 ([GIR53](#)). Building Research Energy Conservation Support Unit BRECSU. [CIBSE Archive](#)