



20 times more airtight than a standard build



Uses 90% less energy to heat than an average home. Heating costs around £75 a year



Optimises heat from the sun



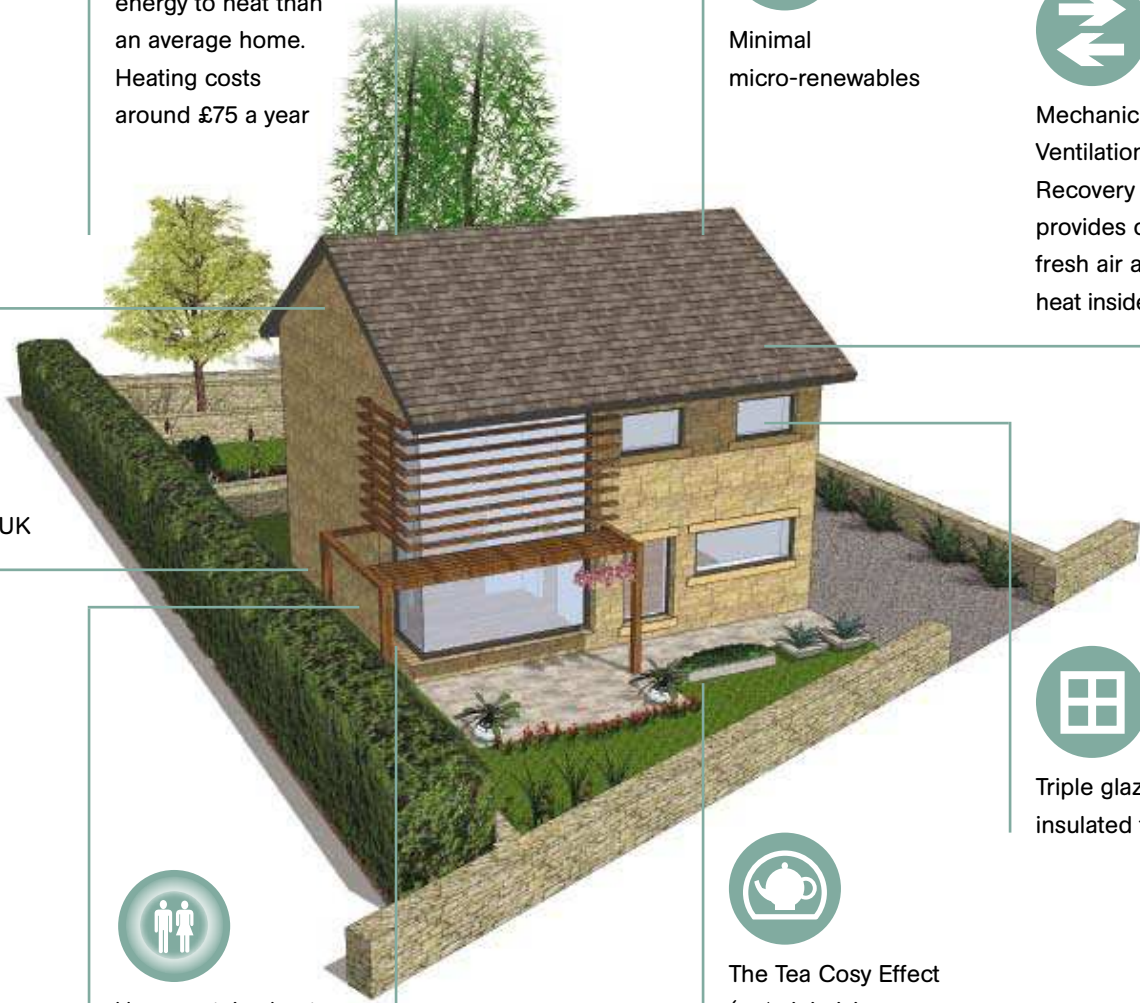
Minimal micro-renewables



Mechanical Ventilation with Heat Recovery (MVHR) provides constant fresh air and retains heat inside the house



First cavity wall Passivhaus in the UK



House retains heat from sun and occupants' activities













Super-insulation



The Tea Cosy Effect (or 'minimising thermal bridging'). Wrapping building in insulation minimises any breaks or cold spots



Triple glazing with insulated frame

	<ul style="list-style-type: none"> ■ 90% reduction in energy use for heating compared to UK average. ■ Heating costs expected to be around £75 per year. ■ £141,000 build cost. ■ 118m² three bed detached house, costs\m² = £1194.
	<ul style="list-style-type: none"> ■ Heat from the sun, occupants' body heat and daily activities, like cooking or showering, is usually all that is needed to heat the house. ■ On very cold days the house will need an extra 1.18kW (the equivalent of one bar of an electric fire), provided by a small gas boiler. Finding a boiler small enough was the challenge. The lowest available was 4.9kW.
	<ul style="list-style-type: none"> ■ Mechanical Ventilation with Heat Recovery (MVHR) supplies clean, filtered air to the house and removes stale air. ■ Retains up to 90% of the heat from the outgoing air by heating up the incoming air, by means of a 'heat exchanger'.
	<ul style="list-style-type: none"> ■ Windows and doors have ultra efficient triple glazing combined with insulated timber frame. ■ U value = 0.8 W/m²K.
	<ul style="list-style-type: none"> ■ 20 times more airtight than houses built to current building regulations. ■ Airtight measures include: wet plaster barrier applied inside the walls; minimising shrinkage between wall and floor; and use of airtightness tapes and membranes.
	<ul style="list-style-type: none"> ■ The Denby Dale Passivhaus is the first Passivhaus in the UK to be built using cavity wall construction (a traditional British building method). ■ Offers 'thermal mass' to stabilise temperatures all year round by retaining heat in winter and cool in summer (the 'cave effect').
	<ul style="list-style-type: none"> ■ Heat from the sun utilised as house faces south to optimise these 'passive solar gains'.
	<ul style="list-style-type: none"> ■ Retains heat in the building through super insulation. ■ 300mm in walls. ■ 500mm in loft. ■ 225mm in ground floor.
	<ul style="list-style-type: none"> ■ The Tea Cosy Effect (or 'minimising thermal bridging') means reducing any breaks in the insulation to an absolute minimum. ■ Careful attention is given to installation detailing of windows and doors and any apertures which might leak energy out of the building.
	<ul style="list-style-type: none"> ■ Design team preferred to put resources into Passivhaus energy efficiency measures rather than costly, and often ineffective, micro-renewables. ■ However, the Tunstalls received a grant to install solar thermal panels for hot water.

Green Building Store

- The Denby Dale Passivhaus was built for private clients in Denby Dale, West Yorkshire, by Green Building Store's construction division – Green Building Company.
- Green Building Store is a specialist manufacturer/ supplier of: FSC timber windows and doors; water-efficient toilets and sanitaryware; Passivhaus products; and natural building materials.
- Founded in 1995 by three experienced building professionals (Bill Butcher, Chris Herring and Steve Slator) in response to the poor availability of ecological building products.
- Committed to doing all to can to help tackle climate change and to act as a centre of excellence, championing best practice in low carbon and sustainable construction.
- Winner of Queen's Award for Enterprise: Sustainable Development 2009.
- Based in Heath House Mill, Boster Moor, Golcar in the hills above Huddersfield.

Passivhaus design

- Passivhaus design is already popular in continental Europe but is still relatively unknown in the UK. Passivhaus design was first developed in Germany almost 20 years ago and is based on well researched and proven building physics.
- Instead of complicated design and expensive bolt-on renewables, Passivhaus design relies on a simple tea cosy effect: with maximum use of super insulation and stringent levels of airtightness. By combining this with optimum levels of 'passive solar gain' (heat from the sun) and Mechanical Ventilation with Heat Recovery systems, Passivhaus design can create healthy and comfortable buildings that require minimal heating.
- Passivhaus buildings can achieve 90% cuts in heating bills for their occupants. The heat generated from the sun through windows, occupants' (and pets'!) body heat, and heat from cooking and showering activities is often all that is needed to warm a Passivhaus home.

Passivhaus benefits

- Green Building Store believes Passivhaus design offers the most effective (and cost-effective) way the construction industry can respond to the urgent threat posed by climate change.
- Buildings (in construction and use) are responsible for a massive 50% of all UK CO₂ emissions.
- Green Building Store believes that urgent action is needed to integrate Passivhaus standards into UK targets for low and zero carbon buildings in the UK, through the energy elements of Code for Sustainable Homes and upcoming revisions of the Building Regulations.
- Experience from Germany suggests that, initially, building to Passivhaus standard adds around 20% extra on top of a normal house build but that over time additional costs come down to as low as 5%, as builders and designers become used to the Passivhaus methodology.
- Passivhaus measures last the lifetime of the building, unlike micro-renewables which will need continuing maintenance and eventual replacement. The Denby Dale Passivhaus cost £141,000 to build (£1194/m²) and Green Building Store believes that costs could be reduced further through economies of scale, repetition and familiarity.

