Passivhaus: your questions answered

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1 What is it?

Passivhaus is a tried and tested design principle based on sound building physics, its aim is to achieve a healthy, comfortable and stable environment for building occupants. The concept focuses on reducing energy usage, rather than meeting demand by using renewables.

The standards:

- Passivhaus classic **(most common)**
- EnerPHit (retrofit)
- Passivhaus Plus
- Passivhaus Premium (incl renewable energy generation)

Passivhaus classic spec

Airtightness n50	≤ 0.6 ACH @ 50 Pa
Space Heating Demand	≤ 15 kWh/m².a
Peak Heating Load	≤ 10 W/m²
Primary Energy Renewable	≤ 60 Wh/m².a
Space Cooling Demand	≤ 15 kWh/m².a
Surface Temperature	≥ 17 °C

2 Why do it?

Passivhaus benefits include:

Low energy demand	>>

Reduced rent arrears

High levels of user comfort

Improved resilience

A route to net zero	>>

Little or no gap between design and performance

Future homes compliance

Longer fabric lifespan

70-90 %

less energy demand than traditional housing

A robust way to achieve zero-carbon buildings is to reduce energy demand to the Passivhaus standard and source renewable energy to meet the remaining minuscule demand.

Reducing operational and embodied carbon is not an either/or choice. We must aim to tackle both simultaneously

3 Is there a cost uplift?

There is a cost uplift during construction. This is circa **10%** reducing to circa **4%** with an experienced team, and supply chain maturity.

Take into consideration **lifetime costs** however, and your Passivhaus project will have a higher quality build, lower running costs, lower maintenance and higher capital value. Recent research by L&G indicates:

- Buyers looking for a new home are willing to pay a **10% premium** for a low carbon property, and gen z future buyers **20%**.
- Renters are willing to pay a **13% premium** for a low carbon property.

Early adoption adds more value: The earlier you adopt Passivhaus to your project the more value you will derive from efficiency and payback.

4 How do you do it?

Passivhaus encourages optimisation of embodied carbon through efficient use of materials and radically reducing the heating and cooling plant.

PHPP

The PHPP (Passivhaus Planning Package) is used to assess the energy efficiency of a building through the conventions of the Passivhaus principles.
A PHPP calculation needs to be undertaken by a Passivhaus Consultant for each building. This is done at the end of RIBA stages 2, 3, 4 and 5.

Design

"Form heat loss factor" (The area of external envelope through which heat will escape vs the area of usable internal floor area). This impacts the overall energy efficiency of the building. The better the ratio the more economical the solution.

Glazing: Carefully balance solar gain vs overheating.

MVHR: Mechanical vent and heat recovery units that are near an external wall will limit heat loss from the intake and exhaust ductwork.

Create a continuous **thermal envelope** and limit **thermal bridging**. Unheated spaces (such as plant and bin stores) should be grouped or sited outside of the building to keep the thermal line as compact as possible.

Create a **continuous air tightness line**.

Construction

Create a **mock-up:** avoid costly construction defects.

Plan methodically: ensure the as built inspection and certification align with practical completion.

Certification

Every Passivhaus project aiming for certification requires a Passivhaus designer / consultant and an independent certifier.

The certifier will undertake an initial design review at RIBA 3, a design review at RIBA 4, and construction review at RIBA 5.

5 Do I have to certify?

- A considerable amount of the Passivhaus cost uplift is apportioned to the certification process.
- It is possible to design a building using the PHPP to Passivhaus Principles, however the rigour of the process supports the quality of the outcome and performance of the building.
- AECB CarbonLite or Retrofit standards also use the PHPP and provide an alternative certification route with less stringent criteria.

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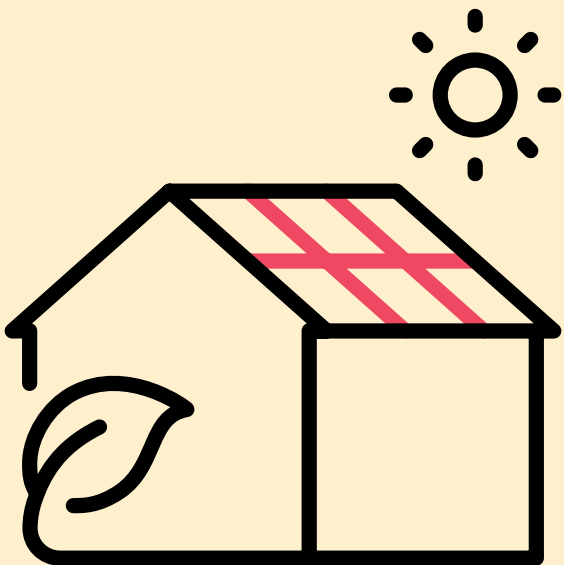
Greenhaus, Salford. Designed for the English Cities Fund. 96 affordable mix of 1 & 2 bed units. One of the largest residential Passivhaus developments in the UK.

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