Misunderstanding the principles

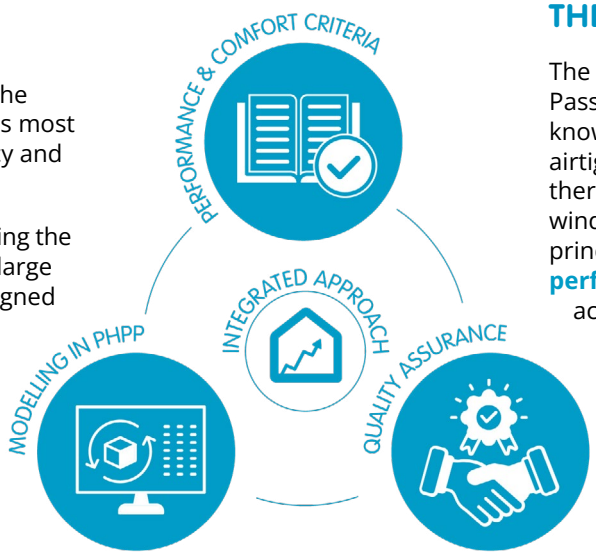
An integrated approach encompassing the principles of detailed performance and comfort criteria, accurate modelling, and quality assurance mean that Passivhaus buildings, unlike most UK new build, reliably perform as designed. Applying some but not all the principles of Passivhaus carries the risk of poor outcomes and significant costs.

Passivhaus Trust

WHY PASSIVHAUS?

The Passivhaus standard is arguably the world's most widely adopted as well as most rigorous standard for energy efficiency and comfort in buildings.

One of the original drivers for developing the Passivhaus standard was to close the large gap between how buildings were designed to perform and how they perform once occupied. At the time, just like now, many buildings already had insulation and good glazing, but failed to perform as expected.



THE PASSIVHAUS PRINCIPLES

The Passivhaus Trust defines eight Passivhaus principles: not only the well known building principles of insulation, airtightness, ventilation, minimised thermal bridging, and high-performance windows, but also the three core principles of approach: detailed **performance and comfort criteria**, accurate **modelling in PHPP**, and rigorous **quality assurance**.

Together, these eight principles form an integrated whole that reliably delivers performance, comfort and durability.

THE PERFORMANCE GAP

The performance gap between design and in-use energy performance in the UK is well documented and, conservatively, is found to result in a 60% increase in space heating demand in residential and often considerably more in non-residential buildings.

Passivhaus buildings, by contrast, are reliably found to perform as designed on average. The clear targets, the stringent quality assurance process of Passivhaus certification, and the accuracy of modelling in PHPP are contributing factors towards these consistently successful outcomes.

"The City of Edinburgh Council has adopted certified Passivhaus as a proven approach. It provides clarity around design and construction expectations, thereby ensuring building performance and user comfort expectations are delivered."

Patrick Brown, Head of Capital Programmes, City of Edinburgh Council

WHAT'S IN A NAME?

Passivhaus is not a trademark. However, if someone claims that a building is a Passivhaus, they are claiming that it meets the standard's strict energy, comfort and quality requirements. Unlike 'eco-home' or 'sustainable building', to describe a building as a Passivhaus is a clear and verifiable claim under consumer protection regulations.

But phrases like "Passivhaus lite", "following Passivhaus principles", or "inspired by the Passivhaus standard", are not clear and are likely to be misleading – giving a false impression that the project in question will perform like a Passivhaus, without meeting all the criteria and requirements.

In *Claiming Passivhaus* (PHT, 2025), we provide guidance on using the word correctly, and on the legal context in the UK. Download the guide for free at: https://pht.guide/claiming Passivhaus.

WHAT'S THE WORST THAT CAN HAPPEN?

In *Misunderstanding Passivhaus Principles: Being Aware of the Risks (*PHT, 2025), we look at the cases of two projects in Wales where the clients were ambitious in their intention to provide reduced operational carbon emissions and lower energy bills for residents – but an ill-defined brief, absence of energy modelling, and lack of attention to fabric and quality led to poor outcomes and significant costs.

The kinds of costs the clients faced after completion included:

- **Cost of occupant discomfort**
- **Higher energy costs**
- **Cost of rectification**
- **Reputational cost**
- **Higher build costs**
- **Opportunity costs**
- **Lack of accountability**

On one project, the rectification costs amounted to **£16,000 per dwelling**.

ADVICE TO CLIENTS

The value of a clear brief can't be overstated – referring to ill-defined 'Passivhaus principles' or a design 'inspired by the Passivhaus standard' does not establish clear deliverables.

But by following the principles of detailed criteria, modelling in PHPP, and quality assurance, clients will be able to clearly determine the most appropriate and cost-effective solutions for their project, and ensure that their expectations are met.

The Passivhaus Trust recommends that building clients:

1. Require a **PHPP model** be prepared at the earliest stage
2. Prepare a **cost plan** at an early stage
3. Select the most appropriate **certification target** for your project (Classic, Plus, Premium or PHI LEB)
4. Implement **quality assurance** processes during construction.

Passivhaus doesn't prescribe a single design solution — instead, it enables flexibility by modelling how different components interact to meet performance goals.

TRUE VALUE ENGINEERING

In practice today, the term 'value engineering' (VE)' is often taken as a shorthand for indiscriminate cost cutting, whereby cheaper alternatives are substituted to realise immediate financial savings. But correctly used, VE is an approach to a project which considers the cost of every component *within the context of its function*. It seeks optimal value rather than lowest cost.

When VE is understood in this way, PHPP can be recognised as a very powerful VE tool.

For example, PHPP encourages good building form factor – maximising the valuable floor area enclosed within the thermal envelope, which is where much of the cost is to be found. Similarly, careful consideration of the proportion of glazed areas on each elevation – through carefully balancing the inherently increased heat loss with the freely available solar gain – optimises the capital spend on an expensive component while minimising running costs and risks of overheating.

"A Passivhaus building is simply good business for Salix Homes and our customers; it directly supports our customers' health and economic needs and is aligned with our key partners' carbon reduction and place making aspirations"

Sue Sutton, Chief Executive, Salix Homes

ADVICE TO CONTRACTORS AND CONSULTANTS

For contractors and consultants, references to "Passivhaus principles" in a brief or contract — without further clarification — can create ambiguity and increased risk. Without defined criteria, there's ample room for interpretation and disputes. Clear, measurable targets aligned with the Passivhaus standard reduce this risk and support deliverability within existing professional frameworks such as PI Insurance.

In view of this, design and delivery teams would be well-advised to consider challenging a poorly resolved brief, and recommending clarification in terms of achieving the Passivhaus standard.

PASSIVHAUS CLASSIC
Space heating demand ≤15 kWh/m².a, or peak heat load ≤10 W/m², and airtightness ≤0.6 ACH.

PASSIVHAUS PLUS
Criteria as Classic but with renewable generation >60 kWh/m².a and lower primary energy demand (PER).

PASSIVHAUS PREMIUM
Criteria as Classic but with renewable generation >120 kWh/m².a and lower primary energy demand (PER).

PHI LEB
(PASSIVE HOUSE INSTITUTE LOW ENERGY BUILDING)
Criteria as Classic but with space heating demand ≤30 kWh/m².a and a relaxation of other metrics.

VALUE OF CERTIFICATION

Passivhaus certification is independent and impartial, with the Certifier representing the best interests of the building and building owners, now and in the future. It provides a "golden thread" of input throughout the design and construction process. For clients, it means they will:

- **Catch mistakes early** while they can still be remediated
- Benefit from the Certifier's **experience** from a wide range of other projects
- Have **confidence** that they will get what they're paying for.

Read more in:
Misunderstanding Passivhaus Principles: Being Aware of the Risks

DOWNLOAD THE FULL REPORT

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