

Proactive Passivhaus

Practical tips for realising your Passivhaus project

With ultra-low energy requirements and a high emphasis on occupant comfort, Passivhaus seems like a dream solution to the twin challenge of ambitious carbon reduction targets and critical housing needs.

Dominic Gibbs, Associate Director at Gleeds, considers five easy steps that developers can follow to implement this methodology into projects, avoiding spiralling costs and design disasters.

Buildings account for more than a third of global energy consumption. A radical rethink is required to mitigate this dire impact, while answering the critical need for more housing in cities across the world, including London.

One approach is to channel effort into ensuring the energy new buildings consume is from renewable sources, but another is to build in a way such that the finished building will have almost no energy requirements at all, for heating and for cooling.

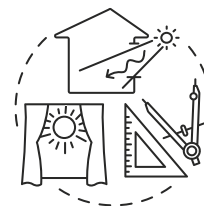
Passivhaus, originating in Germany 30 years ago, is an internationally recognised performance standard and is awarded to extremely efficient buildings, with little to no need for additional heating systems.

Designs for buildings that achieve this status will have certain characteristics, markedly different from the more conventional design and build, because Passivhaus challenges conventional building layouts, glazing, material selection and massing.

Amongst a vast array of features, airtightness is paramount, triple glazing is a must, thermal bridges must be virtually eliminated, and the overall shape of the building is often affected because of the significant impact it has on insulation requirements.

Construction quality and passive design in the envelope are central to Passivhaus status, resulting in exceptional performance in the following areas:

Airtightness



Insulation

Thermal bridging

Ventilation

Triple glazing

Due to a lack of experience and expertise in the UK industry on Passivhaus, the associated design needs and on-site challenges can seem like a significant hurdle. There is also a pervasive perception that adapting a building to achieve the accreditation can lead to prohibitively higher costs and extended programmes. For councils and other clients all over the capital and beyond, this can in turn, become extremely concerning.

The reality is that Passivhaus can't be seen as an adaptation of something already set in motion. For a successful and affordable build that performs as intended, it must be baked into a project's DNA right from day one.

Here are our **five tips** to making that a reality, and keeping the 'Passivhaus premium' as low as 5%:

1 / Define clear aims and objectives

Decide exactly what you are aiming for. There are different accreditations offered by the Passivhaus Institute (PHI) for different levels of building performance: Passivhaus certification, the less stringent Passivhaus Institution 'Low Energy Building' (LEB), and EnerPHit – which is an accreditation available for retrofitting and refurbishing existing buildings with Passivhaus principles.

Alternatively, we are also working with councils in London who are taking the rigorous principles of Passivhaus fully to the heart of the design, but not committing to the accreditation – thereby taking action to meet their net zero targets without the pressure of a 'success vs failure' mentality when it comes to actually gaining the status.

It is also crucial to be well informed from the get-go on what is required to meet that goal. The PHI itself and other organisations such as the Passivhaus Trust are a great place to start to educate yourself and your team on the principles and requirements.

Of course, it's also essential when building your team of consultants and designers, to make sure they too understand the different demands that will be made of them, and criteria they must meet.

2 / Be intelligent about design

The design features that mark out a Passivhaus project have been touched upon above and described in much more detail elsewhere. One of the most important things is to understand that they are integral, and not try to adapt a conventional design to be 'more Passivhaus' when the design process is already well underway.

For this reason it's important to work with designers who can either demonstrate previous Passivhaus success, or – in a market where there is not a huge wealth of experience – demonstrate a real understanding of the criteria to be met, and an active commitment to educating their staff. Formal accreditation for professionals as well as buildings does exist and can be a useful marker.

Clients should consider developing the design further than they may do on conventional projects prior to tender to increase the attractiveness of the project to the supply chain. This is a must for the building envelope and MEP which will typically equate to 40%-50% of the construction cost.

Being clear in tender documents with the supply chain about the Passivhaus requirements and aims on the project is critical. Too often we see vague requirements in design documents that do not make clear the output required from contractor.

3 / Get cost experts instructed at an earlier stage of the project

Many of the problems encountered by Passivhaus projects involve finding out too late that making features of the design compatible with accreditation will be prohibitively expensive. Abortive design costs and wasted time can be avoided through early cost advice at Royal Institute of British Architects (RIBA) Stage 1. This allows developers to make an early decision on the path for its project which may be one of the Passivhaus options or using other measures to reduce the buildings carbon impact.

It is highly preferable to change fundamentals about a design at RIBA Stage 1 if it turns out – for example – that the insulation required to achieve the accreditation for a given building shape would be an astronomical cost. For one London council, we even consulted on two different early designs – one Passivhaus and one conventional, allowing the client to move forward armed with incredibly detailed knowledge, and on track to realise their sustainability goals without nasty surprises further down the line.

At Gleeds we are working on Passivhaus projects across the capital and growing our knowledge base and associated datasets by the day. The case study outlined in this article has enabled us to produce a new model for costing projects of this kind.

Information like this is powerful and, especially when obtained early on, helps keep the total ‘extra’ costs of building Passivhaus to as little as 5%.

4 / Develop open-source collaboration within the delivery team

Of course, none of this hard work on advancing the design and gathering robust intelligence on cost means anything if it isn’t shared, refined, and shared again. Effective collaboration is a prerequisite to success in any project, but it takes on an added significance when the sustainability credentials are so stringent.

Designers need to buy-in to and understand the key design assumptions that enable a Passivhaus project be viable to build and communicate challenges during design development with the team so that solutions can be found. Both balcony designs and positioning can be a sensitive topic with planners and require careful consideration, especially on Passivhaus projects.

Information about cost and design features impact each other directly, and dialogue needs to flow freely in both directions to maximise the chances of that impact being wholly positive.



5 / Contractor selection is critical

Naturally, when a project like this gets to site, the contractor's performance is going to be make or break. A design might be perfect, but if there is a lack of understanding on the impact a Passivhaus design will have on quality requirements and programme, the results could be disastrous. There is simply no room for error with the standard of work on site, so exceptional monitoring and quality control must be a central feature to a contractor's approach.

It's yet another reason why designs should be more advanced at an earlier stage of the project. With more information available during the tender process, contractors will be better placed to assess what they need to do to deliver, and are less likely to be put off by assuming the responsibility of successfully securing accreditation.

What's more, it's likely that tendering firms will want to look into their supply chains, and need the extra information for this. Because of the specialist skills and high standards involved, it could be that they will use higher tier providers than might be standard for a conventional project – particularly in the case of social housing developments.

A well-integrated cost manager will be in prime position to assist with this more involved and thorough tender process. Contractors will have questions; on the project outlined in the following case study, we assisted Ealing Council with running Q&A sessions between the competing firms and a Passivhaus expert, which generated very well informed tender returns.

The successful contractor has since sent their staff on specialised Passivhaus training – building on this collaborative tender process and demonstrating the importance of getting resources up to speed.

Final thoughts

Success with Passivhaus comes down to being clear about your aims and assembling the right team to deliver the project. Making smart choices before a shovel hits the ground, and attention to detail when it does will result in a beautiful, affordable building, whose occupants are happy to be there. Furthermore, it is a tangible step forward in your project achieving Net Zero Carbon (NZC).



Project summary

Green living from Ealing Council



© Bell Phillips Architects. Visualisations by Secchi Smith.

At the start of 2021, the contractor was appointed to deliver one of largest Passivhaus schemes in London for Ealing Council. The project is spread over six underused brownfield sites, with a total of 134 residential units, two commercial units, and a library at the heart of the new community. All the projects have been designed to achieve Passivhaus accreditation, with over 50% of the dwellings set to be affordable housing.

“Thanks to a collaborative approach from the project team, we have experienced fast pace and efficiency throughout the planning stages. Within an agile environment we have been able to collect valuable lessons learned to adjust and improve our workflow as we go along.” – Matt Barrington, Head of London Residential, Gleeds

The design team were appointed early in 2020, with planning achieved by December 2020. The procurement process was then swiftly completed in January 2021 and the next stages already well underway. The programme is currently ahead of schedule, with completion set for the summer of 2023.

Ealing Council's forward-thinking climate strategy includes a target for all new council homes to be built to NZC standards by 2022, as part of their wider push for the entire borough to be net-zero by 2030. Projects like this are enabling them to meet these goals in a fast, affordable and efficient way, with the occupier in mind.

Architect Bell Phillips Architects / **Structural engineer** Momentum /
M&E consultant JDP / **Cost manager** Gleeds /
Passivhaus consultant Qoda / **Main contractor** Henry Construction

Client

Ealing London Borough Council

Construction cost

Confidential

Gross internal area

12,291m²

Form of contract

JCT Design and Build

Completion

Summer 2023

- ✓ Clearly defined objectives
- ✓ Intelligent design thinking
- ✓ Cost experts at early stages
- ✓ Good collaboration
- ✓ Solid contractor selection

About the author

Dominic leads a range of projects for Gleeds from super-prime developments in Central London, to large regeneration projects in Greater London and the South East of the UK. Dominic has a passion for enabling challenging projects to be built and is working with a wide range of clients to help achieve their sustainability goals.

Get in touch at dominic.gibbs@gleeds.com



Talk to an expert



Colin Field
CO-HEAD OF LONDON
COST MANAGEMENT



Guy Meadows
CO-HEAD OF LONDON
PROJECT MANAGEMENT



Joanne Murray
SUSTAINABILITY
CONSULTANT

Shaping the future of the built environment with an ethical, sustainable and socially conscious mindset

Gleeds is an independent property and construction consultancy, specialising in Cost Management, Project Management, Building Surveying, and Strategic Advisory.

With upwards of 2,000 people in more than 70 offices around the world, we have built our reputation by collaborating on meaningful projects with our ambitious and forward thinking clients.

We have existed for over 135 years, and our impartial intelligence and drive for innovation is key to delivering real estate and infrastructure projects in budget, on time, and to an exceptional standard.

Find out more at [gleeds.com](https://www.gleeds.com)

