Wimbish Passivhaus Homes Deliver

A two year Building Performance Evaluation Study, supported by the Technology Strategy Board and the University of East Anglia, has verified that the Wimbish Passivhaus development meets Hastoe's objective of delivering very low heating bills that reduce the impacts of fuel poverty on their tenants, and that have the potential to reduce rent arrears. The development performs as designed. The occupants have homes that are economic to run, healthy to live in and feel comfortable and spacious. Some residents state that their heating bills are only £120 a year.

Findings

General View: Houses to right, flats to left

A Passivhaus is expected to be comfortable at all times. The mean temperatures in February 2013, the coldest month during the study, were within a degree or two of the Passivhaus design level of 20 °C. The residents reported *"never feeling cold"* and *"(we) hardly ever use heating".*

On average, the properties show a gas consumption saving from the Ofgem medium expectation of around £500 a year (excluding VAT).

Electricity consumption in the houses ranges around Ofgem's medium figure of 3,200 kWh a year. This significantly exceeds the Passivhaus design expectation. The consequences of this 'normal' electricity use are 'normal' electricity bills, and an additional heat gain. In winter, this heat will reduce the gas demand, but in summer, it may need to be purged from the properties.

The mechanical ventilation with heat recovery delivers good air quality, thermal comfort, and heat recovery. But, the fans are generally working a bit harder than they should and using more electricity. The annual cost of running the fans is about £50, this enables the gas bill saving.

The Passivhaus approach sets high expectations for the build. Wimbish fabric tests returned slightly disappointing results; however, the extra cost of heating the largest 3-bed properties would only be about £10 a year, illustrating the resilience of the approach. Wall u-values from in-situ tests were worse than the design and air permeability retests found some deterioration (though these results are still much better than building regulations require).

The residents tell us they like the generally warm internal temperatures. However, this can make it easier for temperatures to rise during a hot spell. Some households accept feeling hot in a heat wave, but others do not. It seems that if residents know what to do to control the temperature then peaks are more acceptable.

Variations in summer warmth may be explained by many factors including excess heat gains from appliances, high occupation density, small properties, and residents not always behaving as expected.

The study has confirmed that building to Passivhaus quality is the way to deliver excellent low energy homes at an affordable cost, delighting both residents and the housing association. This is remarkable because the development was a first for all involved and the experience will bring future improvements.

For further information, see the '*Performance Evaluation Executive Summary*' document.

Tips for Passivhaus development

The client must clearly state their performance expectations for the development, as well as the need for quality and a partnership ethos throughout. The client must also ensure a high and proficient level of supervision.

All parties and individuals must have the relevant skills and experience in Passivhaus design, construction and maintenance.

The design (architectural, structural and mechanical & electrical systems) must involve all parties and must be agreed and be fixed early in the process.

The design should focus on what works for the occupants (and then for support and maintenance); making it easy to be comfortable and to obtain the expected benefits with minimum effort.

The developers should encourage and support residents to make wise choices in buying efficient appliances and employing best practice in use.

The sensitivity of the Passivhaus design to variations in materials and construction quality, to changed occupancy levels and behaviour patterns (such as electricity use) should be assessed.

The ventilation system is a vital component. All stages, from design to handover, must be undertaken to the best possible standard.

The heating and hot water system design must be carefully thought through by considering life cycle costs, ease of use by the resident (along with confidence that it is working) and information for maintenance, and the design must avoid any unintended consequences.

The contractor must employ workers who understand the need for quality processes and who take pride in their workmanship. They must appoint and empower quality champions.

Changes during the works, often labelled 'value engineering' must be resisted, unless unavoidable and all consequences have been fully considered.

Testing must be undertaken early, so that any defects can be addressed.

Commissioning must ensure systems achieve the design intent.

Resident education and support must be carefully orchestrated to convey and reinforce essential lessons.

Systems must be maintained regularly to ensure continuing optimal performance.

The performance of the development should be evaluated to learn lessons for future developments and to remedy any shortfalls.

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