

The Greenhouses, London

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Sustainable Design

The Greenhouses, West London, is a collection of 30 highly energy efficient homes, including apartments, maisonettes and mews houses.

The scheme was developed by Octavia Housing, a not-for-profit organisation providing thousands of people with affordable homes in inner London. Octavia commissioned architects Cartwright Pickard to design the project.

Innovating with Passivhaus

"We were able to merge our knowledge of offsite construction and lean design techniques to meet the rigorous Passivhaus air-tightness requirements on the Greenhouses."

Associate Architect, Cartwright Pickard

The thoughtful and careful design of The Greenhouses has resulted in significantly lower running costs for residents. This is primarily thanks to innovative design and construction techniques that are proven to deliver more sustainable, energy efficient structures.

Of particular prominence is the scheme's achievement of the rigorous but Passivhaus standard. Pioneered by the Passivhaus Institute in Germany, this standard is achieved where design leads to ultra-low energy consumption combined with consistently good air quality. It can ultimately deliver savings of up to 90% on occupiers' annual space-heating bills.

The urban design challenge

"The design is informed by the local context and complex site constraints... that is the success of the scheme... the buildings are contemporary whilst fitting in with their surroundings"

Associate Architect, Cartwright Pickard

The Greenhouses demonstrates how innovation through design can overcome local challenges, reduce carbon emissions and wasted energy, as well as provide a very economical and extremely comfortable living environment.

Firstly, the collective will for achieving Passivhaus was far greater than the experience, with Cartwright Pickard's Associate Architect noting - "neither Octavia nor ourselves had previously designed and developed a Passivhaus project". The site itself was also affected by significant design constraints such as being sandwiched between two conservation areas and the requirement to use brick cladding in keeping with the local Victorian architecture. Use of brick presents a challenge for the Passivhaus system due to high levels of thermal bridging¹.

¹Thermal bridging refers to a situation where a direct connection is made between the inside and outside of a building due to one or more elements being more thermally conductive than the rest of the building envelope, leading to potential heat loss.



In response to these creative challenges, Cartwright Pickard designed two of the buildings to incorporate a superstructure of Structural Insulated Panels (SIPs)². The other two buildings used a concrete frame with SIP panel and brick cladding.

Value of digital design

The value of digital design was also realised at The Greenhouses. Advanced research as well as rigorous and detailed calculations helped to establish the suitability of materials and components for fulfilling the design vision. As Cartwright Pickard's Associate Architect pointed out:

"The Passivhaus House Planning Package (PHPP) and 3D modelling enabled us to continuously monitor and assess the energy loss and consumption of all of the materials and components involved in the four blocks".

The results of design led innovation

"Residents have given really positive feedback so far and are seeing the benefits of significantly reduced fuel bills, reduced pollen in the air, a regulated temperature and a more comfortable living environment all round."

Senior Project Manager, Octavia Housing

All homes at the Greenhouses have been innovatively designed to deliver clean and fresh filtered air into living-rooms and bedrooms whilst extracting stale and moist air from kitchens and bathrooms. The mechanical ventilation system with heat recovery (MVHR) provides pre-warmed air with central heating as a backup, thus keeping homes at a comfortable and consistent temperature all year round.

A precedent for the future

The Greenhouses became the first mixed-tenure development in the UK delivered to a Passivhaus standard. It therefore represents a real step forward in minimising heat loss, achieving stringent air tightness and paying meticulous attention to removing thermal bridges beyond single dwellings. It sets a worthy design standard for future growth in low carbon and energy efficient housebuilding.

The Greenhouses has won several awards that recognise the level of design and innovation.



² Structural insulated panels (SIPs) are a high performance building system for residential and light commercial construction. The panels consist of an insulating foam core sandwiched between two structural facings.