

eHome2

Summary of Key Findings and Learnings from the Phase 1 Research



BARRATT
DEVELOPMENTS PLC



BACKGROUND

- » Energy House 2.0 is a specially-built climate chamber that will recreate temperatures ranging from -20°C to $+40^{\circ}\text{C}$, as well as simulating wind, rain, snow and solar radiation. So you can test our homes in temperatures that you would normally find in either Nordic or African climates able to simulate the weather conditions representative of 95% of the populated world's surface, as well as future climate change predictions.
- » This is important because climate change will mean in the next 20, 50 and 100 years, we will see extreme weather events become much more common and last for longer periods of time, and we will also see a rise in average temperatures (2023 being the hottest year on record)
- » The Energy House chamber enables us to test and futureproof homes and the technologies we put into them, using a real life model and controlled climates, so we get to know what really works when all of the parts of a building come together through design and construction to create a comfortable, affordable and sustainable home .
- » The climate chamber is the largest of its kind in the world.
- » The Future Home Standard consultation, published in December 2023, will be in place in 2025. From then homes built after this date will need to use low carbon heating and hot water systems and world-leading levels of energy efficiency through the use of high performing building fabrics. The Energy House goes beyond the proposed Future Homes Standard and is an important step to ensuring that future housing can be delivered whilst maintaining high standards of design and comfort at affordable prices.



KEY FINDINGS FOR EHOME2:

» Overall Performance Gap:

The house had an overall performance gap of just -3.9% compared to the expectations when the house was designed.

» Ventilation:

The building was designed to provide higher levels of airtightness and the home significantly outperformed expectations at +6.3%. This is a significant step for volume house construction and hugely beneficial when delivering high performing housing.

» This significantly surpassed the expectations for the eHome2 under test conditions, and is an enormous improvement on similar houses, which have previously been tested in the field.

» Delivering housing at scale:

The measured finding indicate that both the R&D knowledge, and products, exist to meet the Future Home Standard by 2025 and with considered design and a sustainable focus can be delivered at scale.

tested so that they work in harmony together and that the correct skills are available with the right level of knowledge and training to deliver the solutions in real application.

» In high performing low carbon buildings, the Mechanical and Electrical Services (M&E) are critically important. Greater service space is required, and a greater level of building service entry points require specific expertise and attention in construction. The design and balance of key building elements needs to be co-ordinated and understood to ensure the right outcome is achieved.

» The key elemental factors to a high-performing building operating beyond the Future Homes Standard are: Building fabric, M&E systems, glazing, occupancy profiles, location and orientation of the building.

» There are gaps and a lack of clarity in the current Building Regulations, and tools that need further work to ensure we do not store issues for the future. Building regulation, planning and warranty providers need to consider and address any issues which may delay or restrict delivery of high performing sustainable housing.

KEY LEARNINGS:

» The greatest challenge is ensuring that the skills exist through the entire construction process (from early design, planning, manufacturing, site, financial, warranty, through life etc) to deliver zero carbon housing at scale.

» Alongside this, it is essential to ensure that installation is correct and solutions are designed in a robust and considered way.

» Minor errors in installation and product commissioning have much greater impacts when delivering a highly efficient zero carbon home. (under performance is amplified in high performing buildings, so minor errors which may never have been identified or caused an issue in the past will become more evident).

» In future buildings the products and time needs to be given to ensuring products and systems are properly designed and

It is possible to deliver a home to the new 2025 Regulations but there is still a lot of work needed to ensure we can do this at volume and consistently. The challenges in traditional process, planning, product, skills and customer knowledge should not be underestimated.

KEY FABRIC INNOVATIONS AT EHOME2:

Fabric – high-performing timber frame system achieving ‘Future Homes Standard’ thermal values. This is Scotframe’s I-Stud timber frame system. Health and wellbeing – we are using products within the house that deliver healthier environments for people by improving the quality of air

Full Lightweight **Weber** Finish - reducing embodied carbon

•Ground floor is **Weberwall** Brickslips on **British Gypsum Glasroc X**

- » Huge reductions in material volume compared to traditional bricks and mortar
- » Savings for speed of install
- » High quality finish
- » Development of existing trade skill but not reliant on bricklayers

•First floor is **WeberRend** render

- » Applied to the same carrier and board system as WeberWall
- » All of the above



ACHIEVING NET ZERO CARBON AT SCALE:

- » The eHome2 build project has enabled us to test the product (a full house rather than a collection of house components) to understand how to deliver a home with this level of performance. It also enabled us to isolate and test the impact of individual parts to ensure we continuously develop and improve homes moving forward, see the performance and benefits to consumers, as well as looking at how we can roll these out at scale, whilst keeping homes affordable.
- » This is not easy, a lot of the technology is being used for the first time.
- » Housebuilders, such as Barratt have to balance the interests of lots of different stakeholders, not least their customers. Barratt build 18,000 homes a year so it is essential design and construction approaches and individual products are tested, understood, and that innovations are implemented in a series of steps to ensure scale can ultimately be achieved.
- » All Barratt homes are built to EPC rating A or B rating, a level of energy efficiency shared by around 1 in 10 of all existing homes.
- » Saint-Gobain aim to “make the world a better Home” through the development of sustainable construction solutions in partnership with our customers and through learning and applying knowledge of building science, manufacturing excellence and future digital development.

As a co-ordinated project both partners (Barratt developments and Saint-Gobain), have mutually learnt and developed our understanding. This has resulted in new building systems and outcome lead design and development thinking.

For full details of the project and the Full 1st Phase Research Report visit:
<https://salford-repository.worktribe.com/outputs?advanced=1&id=2313140>