



## RETROFIT PT.1: SUPPLY AND DEMAND & FABRIC FIRST

WEBINAR, 29TH SEPTEMBER 2020

Mark Arnold is Senior Sustainability Manager at Thirteen Group. They have an ambitious climate strategy in place including decarbonising their portfolio of 34000 stock within 30 years. Mark will give an organisational perspective on Thirteen's fabric first retrofit projects covering stock conditioning, design, and delivery. He spoke about Thirteen's Fabric First *Longhirst* retrofitting pilot. Thirteen, formed in 2017, has around 34,000 homes in their stock with 70,000 customers. They project to spend £1.2bn over 30 years and have a 98.2% Category C EPC rating, producing 91,000 tonnes of CO2 per year. They also generate 10.2m Kwh of electricity per year through their PV panels.

They have carried out a lot of component pilots through the last 5-6 years, including air-source and ground-source heat pumps, 2,5000 properties with PV panels and a Sprayseal roof insulation programme. They have decided that their approach to decarbonisation will be 'fabric-first' to full-house retrofit. They have created a loop, starting with insulation, through airtightness, ventilation and new technology, resulting in desirable homes. In partnership with Savills they are undertaking a holistic survey of their portfolio, looking at their financial requirements of meeting their carbon neutral target and creating viable communities. They are also modelling new digital technology to enable them to work smarter, as well as examining the possibilities of district heating services. They have developed a digital twin of their portfolio, allowing them to best understand potential outcomes of changing U-values of properties and heat demand.

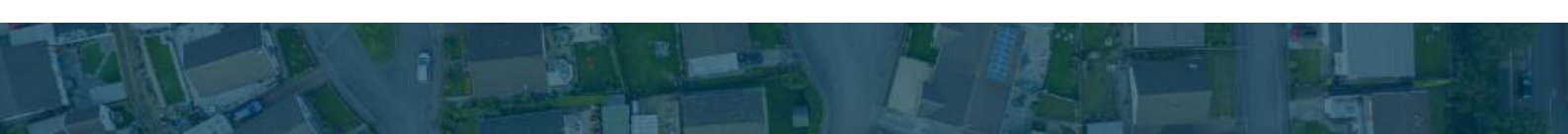
One detailed project to examine is their 1-bedroom bungalow in Coulby Newham which was identified as requiring £24,000 of improvement works to bring it up to a required standard. They opted to trial a full retrofit of the property as a case study exercise. All PVC has been upgraded to triple-glazed. The prop has been modernised throughout, with an open-plan living room/kitchen a mechanical vent heat recovery unit (MVHR). Sensors

throughout the property controls water and heating, allowing the climate balance to be automated. Pocket doors maximise space and a SunAmp water heater heats water very efficiently, with metrics fed back through an in-house developed platform. The MVHR unit is the primary source of heat for the property, meaning it does not require a boiler. Thermaskirt is a secondary heat system which allows the customer to boost the temperature when required.

Key findings of the project included potential shortfalls of the vacuum perforated insulation, which can be damaged if a nail is hammered into a wall for example. Heat and humidity can be difficult to manage when the property is sealed so the balancing system is pivotal to prevent condensation and mould. The SunAmp system is very heavy, causing big issues for installation in flats. The energy demand for the property has been reduced by 76%. Current data shows that the approach will increase their 30-year budget spend by 52%. Their project with Savills has led to them believing they will increase their spend by 35% however, and changes to the electricity grid over time reducing costs as well.

Sarah McClelland, Environmental Manager at Great Places Housing Group, spoke on the housing associations approach to retrofitting and their targets. Great Places have partnered with an insulation manufacturer to research the ways in which greater performance data can be extracted from cavity wall insulation works to identify a potential return on investment. Sarah will discuss how fabric first has featured in her organisations retrofit projects, lessons learned, and offer thoughts on what their research means for insulation works moving forward. Sarah explained that they have multiple targets for the energy efficiencies of their homes over time. Whilst many retrofitting programmes have been carried out, including loft and wall insulation, though information feedback from customers hasn't always been central to this.

EPC and SAP ratings aren't always straightforward, with different materials allocating points towards a final score in a manner which can be misleading and can lead to 'point-scoring' approaches. Replacing electric heating with gas boilers would currently make your EPC and Sap ratings but would weaken your long-term project, building in



obsolescence. Great Places have tried to carry out performance monitoring of their properties, installing sensors throughout homes which log temperature and humidity

readings to see if systems are working as they should be. Thermal imaging technology can also be used, mitigating against a destructive survey.

One of their 1970s estates had been previously insulated, with cavity insulation and electric heating installed. They began to receive complaints from customers around the coldness in the properties and after surveys found that the insulation was sporadically failing, and that loft insulation was deteriorating. They sought to understand how to improve the performance of their works. After speaking to their insulation provider, they established a project to monitor performance in their retrofit. Having completed remedial works they installed sensors to monitor humidity, temperature, CO2 and the movement of inhabitants, using machine learning to understand the energy performance of each house and demonstrate the improvements that had been made.

Similarly to how a car's efficiency is highly dependant on the driver we must view houses on an individual basis, considering the occupants usage in its efficiency. Many insulation and retrofitting methods consider the home with the occupants largely removed; Great Places saw savings on heating bills with these properties range between £300 and £1000. The project taught the association to avoid box ticking and that EPC ratings are just a starting point, with heir running state very important. Customer engagement is vital – Great Places use a liaison officer to ensure that this is fulfilled. Attention to detail, not solely in installation but also in demonstrating cost reduction, ensure the future viability of such schemes.

Nigel Johnston asked whether there was a need for new metrics on energy efficiency ratings and whether EPC and Sap ratings are fit for purpose. Mark Arnold explained that Thirteen are moving away from them entirely, using performance management sensors

and technology to get a more accurate view of their stock. Sarah explained that despite Great Places carrying out a successful retrofit the properties EPC ratings didn't improve, largely because it sought to replace failing components whose deterioration isn't considering in the rating.

