Today's webinar is the second part of the look into retrofit, and the wide range of programmes to making our homes carbon zero ready. Last time we heard about fabric-first approaches and this time we look at the other side of the coin, that of renewable energy generation.

Gwyn Roberts, Megan Walker and Jon Gilbert from BRE Group spoke on developing retrofit strategies. BRE have worked in building science for 100 years, working within physical testing and research advisory programmes, as well as skills and training. Megan explained that they can provide insight on how housing organisations can effectively examine their stock and identify strategy development to make it more sustainable. Retrofitting is essential, with 90% of people's time spent inside. We must ensure that homes work for people and are cost effective to run. As 99.9% of homes are around from one year to the next, we must look to the current stock and work out how to retrofit it for the future.

BRE has been involved in the English Housing Survey since its inception in 1967. At the time there were 15.7 million homes in England and Wales, with 40% built before 1919 and 25% lacking basic amenities. Moving forward to today we now have 24.2 million homes, with over 50% over 50 years old. At the current rate of change a home would have to last 1000 years. While this is clearly unsustainable it shows the need to ensure how our homes perform environmentally and from a health perspective. We therefore need a data driven approach, applying methods that are cost effective and suitable for the dwelling based on building typologies. We must understand what we are working with, knowing what the baseline performance of the current stock is.

In a poll ran during the session, participants confirmed that most had only partial data in relation to this, with only 9% having complete or near-to complete datasets. Megan explained that we can improve the data that we hold by using stock modelling services. It allows providers to identify homes in fuel poverty, understand their carbon emissions, know the levels of insulation and even

estimate household income levels. A comprehensive understanding will allow registered providers to understand the level of improvements needed to reach EPC band C and the likely associated costs. Megan cited an example of Bolton Council, who sought to understand the standard of their PRS stock. By using the BRE housing stock condition model the council were able to target homes where inhabitants had health conditions who were living in poor housing. This provided an estimated £3m of saving on health and social care over 5 years by providing £35k improvement grants per home.

Gwyn spoke about the next steps that providers can take on the journey to achieving net zero. As second poll identified that almost half of the attendees identified their current strategy position in relation to retrofit as being in development, with only 3% having a published strategy. 33% are still considering their strategy signalling that there is a lot of thought at the moment but that we are largely still in the planning stage. BRE can support these activities on four counts: carrying our market capacity reviews; providing detailed analysis; examining other wider challenges and incorporating plans into one grand strategy; and finally providing independent monitoring, evaluation and review. This works is replicable for both new and existing stock, with the technology available suitable in both. They have worked with government on a 'Home of 2030' challenge which seeks to deliver new homes on a range of policy objectives. We mustn't just think about the energy efficiency of buildings when we approach this, but also considering the challenges that people's lives pose. Passive design must be incorporated but smart technology is vital to the process. This will be crucial in extra-care settings, allowing providers to tailor approaches using live data. Gwyn identified the Cornwall Whole House Retrofit project that BRE is involved with, a BESI competition in which BRE have carried out detailed evaluations and analysis for Cornwall Council.

Jon identified the significance investment needed to incorporate these methods into a mass programme. There are multiple possible sources of funding. A third poll asked whether an industry recognised framework for assuring the sustainability of retrofit projects would help accelerate the housing sector's push for net zero? Almost 70% believed that this would be the case, and that a benchmark for sustainability assurance would help. Private funding is becoming encouraged, with a report published by the Green Finance Institute recently explaining that big banks are getting behind the process and that it will happen more in the future. BRE can help with The Green Homes Grant – offering vouchers to homeowners and landlords to retrofit homes – and will be able to help identify the best use of funds secured here.

Charlie Baker

Charlie has overseen two large projects in this vein, one a scaling up project in Yorkshire and a second on homes and energy systems. There are few tools to provide proof as to why we are engaging in retrofit as opposed to waiting for the grid to decarbonise. Red propose that we must try to reduce space heating demands to below 40Kwh. We have a unique opportunity and must not squander it. There are ample opportunities to engage local supply chains and further help improve local communities. Red use triple glazed windows which will outlast standard PVC many times over and over insulation values many times more efficient.

Charlie explained that a major issue is the financing. As you improve the thermal efficiency by 50% the cost doubles each time. Through aggregation we can reach a 'sweet spot' where this drop dramatically. As PV has proved if you can perfect a system by rolling it out at scale we can see the cost of retrofit over the next 10 years. We must do much more with our software, ensuring that processes join end-to-end so that it doesn't require specialised monitoring to understand. He described ventilation as the forgotten aspect of retrofit, explaining that the effect of condensation from internal occupants. The current COVID pandemic has illustrated the health consequences that tenants have incurred due to mould from a combination of poor ventilation and damp homes.

Patrick Berry, Together Housing

Spoke on homes as energy systems, particularly their solar PV and battery pilot project which is currently around 10 months in. Together have around 5Mgw of FIT registered solar products across 1750 systems. Together feel that solar has a large role to play within their decarbonisation process. They sought to test a fundable, sustainable model that would enable them to kickstart a mass rollout of FIT products throughout their stock. This would allow them to generate income through energy production and also play their part in helping to decarbonise the energy grid. They believe that there are significant market opportunities for early adopters at-scale.

The project spans 250 sites in East Lancashire with the plan to install systems and collect a huge amount of data in order to understand the systems and how they interact with consumers in a variety of different operating models. They aim to widely disseminate the data through the sector. 90% of their carbon impact comes from the stock and so the project aims to have a direct impact on that. The power can be stored and underpinning these additional revenue streams is the ability to

sell the power, either to tenants or to the grid. Long-term they hope to be able to sell peer-to-peer if and when regulations change to allow this. Scale is of course critical, with the aim to create the largest sustainable virtual power plant possible.

The basic model for the project follows a solar system which operates dynamically, and which is used directly by the tenant. Any power that can't be used goes into the batteries and future spikes of power – when someone turns the shower on for example – the system will use the battery power. The battery charges and discharges throughout the day, allowing you to maximise the solar power used on site and use the generated power in the evening and overnight. They are working with a couple of energy suppliers as they are not keen to have a separate billing system that they manage themselves and are seeking solutions here. Within the pilot Together are also trying to understand how the systems perform at different directional orientations as this will be necessary as the project is rolled out wider across the stock where the ideal south-facing orientation isn't possible. Within high consumption properties Together have found that the systems work particularly well. Conversely on low consumption properties, such as bungalows of single occupancy, virtually all consumption is met by solar in the summer.

10 months in Together now have enough data to building and test versions of financial modelling. There are a range of private financing routes, but they tend not to offer great value for tenants. Together are testing data with aggregators and also blockchain intermediaries to realise great value of their exports to the marketplace.

Customers were keen to participate given it was free and could save them money. Moreover they've found that people are interested in the scheme and are keen to be involved in this capacity, receiving full breakdowns of their usage every quarter.

Wes McGeeney, renewables manager at Thirteen, spoke on their renewable portfolio, which contains 900 PV properties, 400 air source heat pumps, 350 solar thermal properties and 10 homes with ground source heat pumps. Last year they delivered 100 air source heat pumps (ASHP) installations at a cost of £725,000, seeking to combat fuel poverty and partly funded by the 'Funding Warm Homes Fund'. Thirteen try to minimise visual impact of the pumps, wrapping them in vinyl so

that they blend in. This feature is very popular with tenants. There are various funding opportunities for such schemes. The Renewable Heat Incentive is a fund from Ofgem for the installation of ASHP. Thirteen are currently recognised as the first organisation in England to sell RHI under the HeatRHight scheme administered by Travis Perkins. There are barriers to the process, often from local authorities and planners. Customer behaviour is of course another issue. A comprehensive consultation, education and monitoring process must accompany the installation.