

**SOCIAL HOUSING DECARBONISATION TECHNICAL ASSISTANCE FACILITY PILOT: FINAL PROGRESS  
REPORT**

<b>Hub Manager Name:</b> Michael Gallagher
<b>Partner organisation(s):</b> West Midlands Combined Authority (WMCA)
<b>Date:</b> 15/03/2021
<b>Reporting period:</b> Sep'20-March'21
<b>Report:</b> Final <input checked="" type="checkbox"/> Interim <input type="checkbox"/>
<b>If Interim, estimated completion date of Project/Final Report:</b>

This work has been funded by BEIS but the work and views of the reports are that of the Midlands Energy Hub and its associated delivery partners.

#### 1. Approach to Technical Assistance

a. Please briefly explain why the chosen approach was taken and why it was thought to be the most appropriate? For example, was there a particular known issue in the region with regard to stock assessments/improving stock to a minimum of EPC Band C etc. or was work undertaken to identify this etc.?

There is known to be a national issue in developing and delivering plans to decarbonise the housing stock. Work carried out by the Sustainable Housing Action Partnership (SHAP) over the last 16 years provides an evidence base to help decision-makers move from an assets-based component management approach to an energy performance target-focused strategic planning approach. Nevertheless, there remains an issue for most social housing stockholders of translating the learning from pilots into fully developed strategic programmes with planned and phased delivery through projects and routine works.

A lack of leadership, research, resources, expertise, and experience are evident, while consistency and continuity of long-term approaches, gaps in understanding and engaging with the agenda, problems of reporting, and a wide gulf between leading stockholders and those who have not yet begun their decarbonisation awareness and planning are commonplace.

The pilot was designed to:

- test the interest of stockholders in engaging with technical assistance, and record their appetite, experience and capacity to remain involved;
- scope the level of decarbonisation planning across social housing stockholders in the West Midlands.

An important objective was to investigate partnerships that existed, or could be developed, between leaders in this agenda and smaller less well resourced stockholders (who are further behind in their decarbonisation planning). The potential to map and support the creation of buddy relationships between larger/leading stockholders and smaller/niche social housing providers at LEP level is considered important. The commitment nationally and regionally to the levelling up agenda and leaving no one behind underpinned the design of this pilot, which took a LEP-based approach, inviting stockholders to engage and to share the scope of their relationship with the supply chain and critical partners such as energy companies, in understanding opportunities and barriers to scaling up retrofit.

There was a desire to understand how stockholders see their 'no regrets' pathways between bringing their stock to EPC C and then to net zero.



**b. How, if at all, do you see the approach taken fitting into the long term TAF?**

### **ENGAGING STOCKHOLDERS**

Our finding is that significant bespoke support will be required to create confidence among smaller stockholders that investment of their time in planning for decarbonisation will be of value and that retrofit programmes will be resourced.

Invitations to engage were issued through the SHAP and WMCA membership databases, via networks, by group emails, by e-newsletter, through LEPs, by personal invitations, through third parties to their contacts at an individual level, and publicly advertised events e.g. Eventbrite. This generated interest and some uptake of the invitation to engage in more detail, with the different approaches increasing the level of overall engagement. However, smaller stockholders and many interested and aware but very busy individuals did not respond, despite personal introductions and repeated invitations.

### **REQUEST FOR BASIC INFORMATION AND SAFE SPACES FOR GENERAL DISCUSSION**

An event held on 25 February 2021 demonstrated there was an appetite in the emerging retrofit sector to understand the retrofit agenda, the opportunities, the information and support available, and what others in the sector are doing.

The creation of a safe space for social housing providers, their key stakeholders, and the supply chain is critical. Attendees at the event who are at the start of their decarbonisation planning have requested further opportunities for informal conversations with leading practitioners. They seek to understand the journey others have been on, where they are now, how they plan to move forward, and the options and decision points to take into account.

Stockholders responding to the invitation to take part in the pilot have much information to share. A series of interviews elicited similarities in experience and views but also specific information, experience, reflections and thoughts about next steps.

### **INFORMATION AND GUIDANCE**

It will be important to ensure that an adequate level of follow-on resource is available both to groups working together (for example in creation of a pipeline that will be attractive to the supply chain to incentivise scaling up) but also at an individual stockholder level. Examples of technical assistance required include:

- Assistance in writing procurement documents for stock assessment and the development of a decarbonisation plan;
- Guidance on modelling tools available – pros and cons and how they relate to existing stock management databases;
- Setting energy performance targets and evidence they have been met;
- Clarity on what the energy system transformation looks like and how this relates to a ‘no regrets’ investment pathway to EPC C and net zero;
- Independent advice on matters such as electrification of heating and balancing this with managing down levels of fuel poverty;
- Options for financing retrofit at scale, and delivering deep retrofit whilst making investment equitable for all residents.

### **FINANCIAL SUPPORT**

Costs for feasibility studies including data gathering, cleansing and analysis are considerable and support for these costs, and time to undertake these activities, must be factored into budgets and future programmes.



Department for  
Business, Energy  
& Industrial Strategy



West Midlands  
Combined Authority



## 2. Project Outputs

### a. Please describe the method you took during the TAF Pilots?

The West Midlands Combined Authority (WMCA) commissioned SHAP to undertake work on the pilot given its long-term relationship with the housing sector and social housing landlords across the West Midlands. Several large stockholders had previously contributed to SHAP research, in particular, to reports in 2009 – Beyond Decent Homes, and in 2010 – the Community Green Deal, which investigated scaling up retrofit, the costs and building blocks and mechanisms to build area based approaches and cost reductions.

In undertaking this Social Housing Decarbonisation Fund Technical Assistance Pilot for BEIS, the researchers drew on previous relationships and knowledge, and investigated the current thinking, planning and delivery of retrofit by former research collaborators and other stockholders.

The approach taken was to consult widely on two objectives, with specific invitations by LEP area:

- such that a range of stockholders with different archetypes and geographies could respond to the BEIS research; and
- to investigate, as part of the levelling up agenda, the potential for a long-term partnership and knowledge transfer to be built between larger, better resourced stockholders and smaller ones, whose stock might be more difficult to decarbonise and offer services to a particular tenant demographic.

The methodology involved:

- Working with a social housing lead in each West Midlands LEP, documenting their stock condition surveys, strategic asset management approaches and their engagement with the supply chain
- Working with a variety of urban/rural and on and off gas archetypes
- Working with a mix of RPs, ALMOs and Local Authority stockholders

Engagement mechanisms included:

1. invitations to LEP area meetings to take part in the detailed research
2. interviews and responses to queries from landlords
3. follow up interviews and completion of the Excel reporting sheet
4. stakeholder round tables
5. webinar

Our assumptions in designing the pilot included:

- social housing decarbonisation proposals will form a model for all tenure retrofit;
- joined-up activity across the West Midlands will ensure effective and efficient mechanisms are designed and delivered to ensure supply chain capacity can be built and high-quality outcomes can be achieved;
- taking COVID 19 impacts and requirements for healthy homes and safe construction work practices into account;
- innovation will be required to scale up retrofit, whilst seeking cost effective solutions;
- value for money over the long-term, rather than lowest cost, will be the driver for the design solutions, supported by close attention to quality, quality assessment and monitoring;
- the pilot will secure close cooperation from social housing providers;
- that finance will follow to deliver designed stock retrofit and turn the pilot into realised projects.



The pilot drew on the learnings from a wealth of previous SHAP research<sup>1</sup> mentioned earlier and including:

- Turning Housing into Homes Fit for 2050 (2019) which analysed a range of finance/funding sources and revenue stacking, investigated tenant behaviours following deep retrofit through the Accord Sustainable Retrofit and Smart Grids project; and
- the 2019 Warm Homes Saves Lives programme development process undertaken for Energy Capital recommending an approach modelled on the current Scottish scheme.
- Scaling up Better Homes Yorkshire (2020), research led by Red Coop with SHAP and Salford University

Key issues which were considered as part of this work included:

- quality of stock condition data and cost to improve stock data, so that it can be used for modelling and design purposes;
- whole house retrofit plan approaches, so that investment can be made on a ‘no regrets’ basis at every stage of investment and will link to planned cyclical investment programmes;
- current supply chain capacity and the cost and pathways to develop that capacity, particularly in the light of the impact of COVID 19 on the supply chain and the need for the supply chain to develop new operating methods;
- building the trust of tenants whilst managing the disruption of retrofit, particularly for the more vulnerable and less able to cope;
- ensuring that retrofit measures installed, particularly low carbon heating and all ventilation systems, are easy to operate and it is made difficult for unintended consequences to occur.

Following multi stakeholder meetings at LEP level in September and October 2020, follow-up meetings were organised with a number of social housing providers for November and December. Interest in engaging with the BEIS TA pilot was confirmed and general feedback on the plans and progress of the organisation towards completion of a decarbonisation plan was given. These were followed up with 1:1 meetings to go through the BEIS TA reporting KPIs in detail. Capacity to meet during November 2020 was impacted negatively due to the activity to develop SHDF Demonstrator bids, follow-up on LAD 1a and discussions about interest in LAD 1b.

It has been difficult to engage smaller stockholders/niche HAs and some larger Local Authorities despite repeated attempts to contact them both directly and through other stakeholders involved in the BEIS SDHF TA research who felt they might have personal or organisational relationships. Additional research capacity was created to develop further engagement in 2 L~EP area, namely GBSLEP and the Marches.

More general information was sought from stockholders and the supply chain across the West Midlands through four surveys that were launched in mid-November and had a closing date of 13 December 2020. The surveys were specifically designed to investigate issues of fuel poverty capacity but questions included supply chain capacity, procurement frameworks in use for installers, regeneration plans, and retrofit projects in delivery. The surveys were advertised via newsletters, partner networks, direct emailing and at events. The four surveys were intended for:

- Local Authorities;
- Registered Providers;
- fuel poverty support organisations; and
- supply chain.

<sup>1</sup> [www.shap.uk.com/resources](http://www.shap.uk.com/resources)

There were some responses to 1, 2 and 3, but none from the supply chain. The survey launch coincided with other surveys by ALEO, BEIS, and bid deadlines for LAD and SHDF Demonstrator. Those who responded noted that they were not necessarily the right people to complete the survey.

## OUTPUTS

The following have been delivered:

	TOTAL	Total forecast
Per LEP, number of stakeholders in leadership positions engaged	142	6
Number of social housing providers worked with per (6) LEPs (total number) in detail	30	12
Number of current stock condition surveys documented - as part of plans for identifying archetypes	10	12
Number of social housing providers with 1 nominated archetype for further work - including those reporting their SHDF bid proposals	12	12
Number of plans developed to achieve EPC C in nominated archetypes - including those reporting their SHDF bid proposals	12	12
Events organised to raise awareness of and engagement with the research	6	6
Meetings with other housing sector stakeholders	13	0
Participation in national groups / housing sector retrofit events - questions asked, comments made referencing this research / issues arising	3	0

- six costed retrofit designs for six archetypes at locations across the West Midlands and information regarding six further archetypes was shared from SHDF Demonstrator bids
- a summary of barriers to be addressed in delivery of the retrofit schemes and in scaling up retrofit;
- integration of the learnings from other projects that Fuel Poverty Task Force members are involved in;
- a review of the pilot project proposals against financial models such as Energiesprong, which builds the investment envelope, taking into account long term cyclical repairs budgets and maintenance costs pre and post retrofit investment;
- a summary of WM social housing providers interest/opportunity/barriers to engaging in the pilot and building a WM Midlands-scale retrofit programme based on issues detailed in the report.

## ARCHETYPE MODELLING

Common archetypes from the stockholders' EPC data were identified. This involved working through available EPC data and splitting the properties into house type (i.e. bungalow, flat, semi-detached house etc.), using previously produced EPCs and stockholder information to work out the build type.

Information based on these data was used to create simulated properties and input into RdSAP software; this gave a base EPC level to work from to get to EPC C and 'NZC' (as RdSAP Software cannot be used to model NZC a proxy of an A rating was used).

The archetypes then had improvements modelled to achieve EPC C (and EPC A), so as to identify which measures would be needed; and costings were then applied to these measures, based on current industry costs (which were



triangulated to give an average cost). This was repeated to give the range of costs to move from EPC D-G to EPC C, and again for the same archetypes to get to the proxy of an A Rating. All these costs are indicative and could be subject to change based on industry factors and individual dwelling needs.

Additional information and costs were gained from roundtable sessions with stockholders. Information was also available from a Parity Projects Pathways commission developed for a District Council which provided indicative costs and pathways to EPC C and NZC for a largely postwar housing stock. See Annex.

b. Please describe the results of the Project achieved so far.

1. There is a clear demand for technical support to help stockholders at all stages of decarbonisation planning and delivery from those who engaged.
2. Smaller stockholders did not respond despite personal introductions and repeated invitations. Our advice is that bespoke targeted support will be required to create the trust that time invested in planning for decarbonisation will be of value and be able to be resourced.
3. Costs for feasibility including data gathering, cleansing and analysis are considerable and support for these costs, information about tools and clarity on pathways (net zero definition, clarity on the pathway to EPC B + grid decarbonisation v net zero)
4. Interviews with stockholders, utilities, energy assessors and consultants supporting stockholders on decarbonisation pathway planning included those with experience of reports produced by Parity Projects (Crohm, Pathways and Portfolio), IRT DREeam, SAVA, and BRE, and more detailed analysis by Saville's, Adeco, Anthesis, Michael Dyson Associates and others.
5. RdSAP and available EPC data is a good starting point although there are significant queries and caveats over data quality. At a portfolio level, such data can be analysed to provide indicative pathways designs and costs. However, it has become clear that RdSAP does not have enough depth and detail, especially for NZC. There was a consistent view that for detailed delivery planning and design there is no such thing as an archetype and every building will need an individual survey/assessment.
6. Generally, landlords have relatively good stock data. It has been noted that there are difficulties keeping these up to date, with most having a greater emphasis on stock condition surveys. Data may be held on several databases, particularly as result of mergers. EPCs are not always updated when work is carried out on a property, meaning some records may not be accurate but overall most data is accurate. Where tenancies have not changed, there may be no EPCs.
7. Costs for updating existing EPC data and stock data for RPs will quickly become prohibitive, with EPC costs at £50 - £75, full surveys at £75 – £150 and strategic assessments estimated to start at £20,000 - £35,000. However, it should be noted that there are significant efficiency and cost savings from combining stock condition surveys, EPCs and other surveys and inspections. This has been piloted by a large contractor but is not yet common.
8. Overall there is a general awareness of the need to level up stock to Net Zero Carbon. Many RPs are producing or already have in place plans to get to NZC. However, there are concerns over the scale of the challenge, with many lacking adequate funds or capacity to complete the task. For most working in the sector, NZC forms only one element of their job, with them having to fit this work in around their usual roles. It has been highlighted that there could be a need for a dedicated team within each RP, although this



brings up financial issues. Early movers already have Retrofit Coordinators and Retrofit Assessors in post but many stockholders do not yet have dedicated teams.

9. Those that have engaged with the pilot are interested in decarbonisation pathways and preparing to meet future national targets. Many have MEES compliance programme or are developing an energy improvement plan. Energy improvement plans tend to be using EPC C as a target currently. Some are overlaying deprivation data as the quality of information available is improving.
10. Many RPs are running at capacity and noted the long-term planning that decarbonisation will require. For most staff engaged in this activity it feels that there is a level of isolation when it comes to navigating energy improvement of their stock and they would welcome peer learning amongst housing providers.
11. High levels of feedback were given that other financial investment is taking priority – such as fire safety, particularly following the investigation into Grenfell. Other investments pressures include crisis management, pre-planned structural works, and financial constraints arising from the current pandemic.
12. It is important to the RPs that any decision-making is future proofed and robust, not just for the organisations but for their tenants. There is a legacy of non-traditional stock with RPs which is a cause for concern, as this is hard to treat and will be both complicated and difficult to improve to EPC C and NZC.
13. A Fabric First Approach is necessary, in particular where heat pumps are going to be installed, to maximise thermal efficiency and futureproof properties for residents. This was expressed most notably during roundtable discussions, in that installation of heating is not a pathway to NZC and that upgrades to the fabric need to be completed first to make each home fit for purpose and NZC ready. However, as the project progressed, those who had started detailed design and costings for whole house retrofit on a NZC pathway began to voice concerns about uncertainties hindering a ‘no regrets’ decisionmaking process and about the costs for deep retrofit. Concerns included the affordability, viability and equity of deep fabric retrofit. Issues included:  
 the length of time some tenants would have to wait to have their homes upgraded given available budgets;  
 the need to find budgets by cutting back on new social housing development and/or selling stock;  
 not having enough information about the balance between decarbonisation through fabric improvements reducing energy demand versus the complete decarbonisation of the grid;  
 risks of putting additional risk of fuel poverty on tenants by achieving decarbonisation through retrofitting to EPC C or B and relying on grid decarbonisation for the remaining emissions reduction;  
 the split incentive whereby cost recovery could not be shared with tenants.
14. Contractors confirmed that the most effective way to achieve cost reduction is through the efficiencies of working at area based/estate based scales. There are issues even for social housing areas due to pepperpotting of right to buy and the challenge of ‘buy in’ is huge for all tenure areas. As properties will need to be assessed on an individual basis, an area-wide pilot energy improvement scheme would be more beneficial than singular one-off pilots or even a single street pilot. This would provide better overall analysis to whole house retrofit, identify barriers, what works and what doesn’t, gauge tenant engagement and reaction, provider wider cost analysis and will incorporate a varied scale of housing.

#### **OTHER ISSUES RAISED INCLUDED:**

##### **Air Pressure Testing (APT):**

Airtightness will need to be factored into the route to Net Zero Carbon and whole house retrofit. A greater level of airtightness will be required for NZC: it is not included in RdSAP and it is unclear how this might support improvements in EPC scores. Experience from projects using PassivHaus/ Energiesprong design is that achieving this



level of airtightness takes a significant amount of time per home, where air leakage paths must be identified and sealed in a satisfactory manner. Meeting performance targets is difficult and identification of penetrations of airtightness layers can require the use of thermal imaging cameras or a smoke pencil.

Capacity of airtightness testers is generally very good against current demand as all new builds require APT . However, tests for existing stock generally take longer due to the vagaries of older buildings and impact of post modifications either creating or not closing gaps.

#### **Tenant engagement and liaison:**

Tenant liaison forms an integral part of any project. Projected costs for an average sized local authority area can be found below:

- Letters to tenants - £6,000
- Community events and roadshows to engage and inform tenants and wider community - £20,000 - £50,000
- 1-2-1 detailed monitoring - £500 per household (not all homes need monitoring but to build confidence and trust that the investment is achieving what we need it to achieve – assume 10% of all homes receiving measures).
- Home Visits - £150 per household (ensuring tenants are making the most of their installations and for accessing any other potential services available such as health and benefit checks).

A few RPs stated that it might be more functional to engage with a community, on a larger scale.

#### **Performance drivers and motivation from RPs:**

- board driven aspiration, based on environmental and social value aspects;
- anticipation of national direction of travel and expectation of future legal requirements;
- lettable standards;
- maintaining and improving certain conditions;
- affordability for residents; and
- maintaining asset value.

Next steps for RPs include complete in-depth stock investigation, through data cleansing, stock assessments, and filling EPC data gaps including recording kWh/m<sup>2</sup>/p.a. Irrespective of this, technical support is still required.

#### **STOCK DECARBONISATION PATHWAYS**

Some stock will not be able to be decarbonised. Some of this stock can be retrofitted to EPC C or B and some is proposed for demolition and redevelopment. Some landlords will continue to install gas boilers for the near future whilst they understand what electrification of heating entails in terms of CAPEX, OPEX , acceptance by tenants, impacts on levels of fuel poverty and constraints such as grid capacity and interface with EV rollout. Some early movers are continuing to plan for decarbonisation to net zero but are aware of the impact this will have on other investment programmes including development of new social housing. Other landlords, having looked deeper into investment to bring the stock to net zero over the next 30 years are developing greater understanding of the detail of this and may revise their position to wait to embark on deep retrofit until supply chain capacity develops and there is a clearer sight of both CAPEX and OPEX costs. There are widespread requests for more information to inform a ‘no regrets’ decision on investment pathways.



a. Briefly outline whether you felt the project delivered on, or exceeded, its expectations; and why?

The approach taken was to consult widely on two objectives, with specific invitations by LEP area:

1. such that a range of stockholders with different archetypes and geographies could respond to the BEIS research; and
2. to investigate, as part of the levelling up agenda, the potential for a long-term partnership and knowledge transfer to be built between larger, better resourced stockholders and smaller ones, whose stock might be more difficult to decarbonise and offer services to a particular tenant demographic.

The pilot did engage with a range of stockholders with different archetypes delivering services across a range of geographies. The wealth of experience, information and appetite to share has been significant.

There is an interest in the levelling up agenda and in a long term relationship across the sector to build a long term national decarbonisation strategy, programme and phased delivery. However, further activity is required to engage the ‘hard to reach’ landlords who did not come despite the range of approaches to raise their awareness and invite discussion with them.

The project delivered on its expectations in the main, exploring stockholders’ potential project plans to reach EPC C and NZC. Investment pathways were studied, and most stockholders who engaged were beginning to think about the development of future Net Zero Carbon plans, with the aim to begin stock upgrades in the next three- to five-years. Tenant engagement investigations, however, were limited and the extent of engagement varied considerably.

The intention to build mentoring relationships with smaller/niche housing associations by larger stockholders did not develop. The assumption is that smaller stockholders are so stretched that they have not yet begun thinking about decarbonisation.

Some stockholders were looking for funding to do more detailed stock assessment work or to trial tools such as thermal imaging, airtightness testing and drone surveys, and so did not stay engaged beyond initial interview.

Engagement with stockholders was impacted by the LAD and Demonstrator calls which took priority over the BEIS TA pilot activities.

It would have been helpful to have held 1:1 meetings face-to-face to work through the KPIs reporting spreadsheet. Several meetings were curtailed with promises for the spreadsheets to be completed and returned subsequently. This turned out to be difficult for some stockholders given the pressures everyone has been working under.

**It is important that the discussions started through this pilot are continued, with relationships developed and supported in order to expand the communities of interest by topic and geography and build knowledge sharing networks.**

### 3. Project Timeline

a. Is the project on track, or completed, according to the original project plan?

Yes.

b. Outline delays (if any) which have affected the project over the last 12 months. And if interim reporting, also outline what impacts these will have on delivery of the rest of the project?

There were initial delays with stockholder engagement, but no significant impact on the delivery of the project.



There was some delay in confirming two stockholders in each LEP and in getting detailed information to meet delivery of WP4 (Dominant archetypes), and to have any stock disposal and regeneration plans confirmed. This was resolved by bringing in additional research staff with their own local connections to stockholders.

Delays with collating stockholder data due to outside factors and time constraints on social landlords.

Late summer holidays due to COVID lockdown had a bearing on delivery late August, early September.

Local Authority Delivery (LAD) calls and delivery of the SHDF Demonstrator call reduced availability of stakeholders.

**c. How much of an effect did availability of resources impact the project timeline – in terms of Energy Hub, social landlords' and partner organisations?**

There was no impact on the project timeline as set out in the funding agreements. The challenge was to secure time with landlords while they were dealing with Covid and the LAD and SHDF demonstrator calls.

**d. What issues arose around resource availability and why – in terms of Energy Hub, social landlords' resources and partner organisations?**

The budget was sufficient for awareness raising and preliminary engagement with some landlords in the West Midlands. We were able to reach RPs, LAs and ALMOs as well as non-stockholding local authorities and other stakeholder group representatives.

For landlords the availability of resources related to staff time: the majority were willing to engage but time constraints caused issues with providing data and responses to questions. This impacted on data collation at an early stage.

Some more detailed work was able to be carried out with those landlords who had time to engage in follow up meetings and to provide stock data.

The constraint on face to face meetings did reduce the effectiveness of contact time with interviews not resulting in collection of data in a way that might have happened had the meetings been at landlords offices. For example, pulling in colleagues for quick responses to queries was a lot more difficult with remote working. Attendance by researchers at landlord team meetings would have been useful in making introductions, raising awareness and teasing out information.

Some landlords would have engaged more had larger amounts of funding been available for them to commission pilot data collection activities such as air tightness testing, bespoke stock condition surveys or stock assessment at portfolio level using tools such as DREeam, SAVA and Parity Projects Portfolio, although timescales and capacity issues with service providers probably meant these activities were out of scope.

Access to real time briefings on issues such as rate of grid decarbonisation, future energy system transformation scenarios (e.g. hydrogen in the gas grid or grid capacity to take increased heat pump demand) and clarity on where cost reductions will be achieved compared to extra costs to improve quality of process would have been very useful.

Ongoing resource to set up follow on activities as requested by stakeholders including regular spaces (online and virtual) for meetings to exchange information would have been useful.

There was strong interest in more detailed support, revenue and capital, to help with decarbonisation planning and to support delivery of pilots. While there is huge value in knowledge sharing, the reality of an organisation being able to deliver deep retrofit will only be tested through actual demonstrators.



The objective of bringing forward smaller stockholders who are likely to be less engaged in planning for decarbonisation was not met. Additional resource to support more extensive outreach would have been required with activities to raise awareness and engage persisting beyond this project.

Due to current pressures on MHCLG for example, it was not viable to start a conversation about their brokerage through their funding and/or regulatory functions with their stakeholders. This would be recommended.

Other opportunities for engagement to promote the levelling up agenda would be with faith groups and others who provide specialist housing services.

Landlords had very limited/no capacity to engage, which is symptomatic of prioritisation of compliance works, managing annual investment plans, not having dedicated energy teams/officers.

#### 4. Barriers

**a. Please describe any barriers faced in completing all aspects of the Pilot, including undertaking stock assessments; developing energy performance improvement plans; and identifying possible suppliers and funding streams. Please describe any associated potential impact or mitigation plans. If interim reporting, please describe for the aspects of the Projects completed to date.**

##### 1. Constraints on time to engage

Some but not all attendees at events came forward for more in depth engagement. Those not participating further were already busy with internal programmes. Some came forward initially and took part in interviews of approximately one hour and committed to completing data requests but were then not able to participate further due to pressure of work. Others had to reschedule meetings several times due to workload pressures.

Completion of all data requests required internal liaison by landlords and any information provided was largely due to goodwill of a few contacts.

Constrained staff time resulted in many landlords lacking capacity to undertake complete in-depth analysis of their stock, some providing only brief figures and limited information due to dealing with higher priority matters e.g. addressing flooded properties. However, they continued to be keen to be involved in the pilot.

##### 2. lack of dedicated energy teams/staff

There was a lack of capacity overall – surveyors were employed on stock condition but not energy performance related tasks. Overall, levels of expertise varied and some interviewees expressed views that it would be better to have dedicated energy performance surveyors in house – however there is some churn in surveyors for a variety of reasons including salary levels, expectations of geographical spread.

Where interviewees did engage, their depth of responses were impacted by the need to consult colleagues in several teams.

##### c. lack of internal budget lines

There is a range of the approaches to allocation of budgets for energy performance tasks including collating and cleansing data, gathering additional data and then analysing the data to inform strategic planning. Where stock assessment reports had previously been commissioned, some were being revisited to generate detail from high level analysis.



d. use of the BEIS TAF funding

Some landlords had hoped that the TA pilot would provide funding for them to commission pilot stock data collection works such as air tightness testing, so that they could determine their usefulness in order to determine best stock assessment approaches and secure budgets accordingly.

e. lack of response

Where stockholders did not respond to (repeated) invitations to meet, we continue to try to understand what the barriers to engagement are.

Invitations were sent to PAS 2035 accredited Retrofit Coordinators by one RP: however, no responses received.

**b. Please describe any emerging barriers to the development of energy efficiency improvement plans or to conducting improvement works, including potential impact and mitigation plans.**

In summary barriers include:

- finance and funding
- supply chain capacity
- lack of staff resource
- data collection and cleansing resource requirements
- lack of expertise in whole house retrofit and using data
- lack of expertise in monitoring and evaluation of whole house retrofit

**Funding:**

- intervention rates are insufficient to allow stockholders to use internal budgets, which are already allocated to other works;
- lack of funding to undertake EPCs and stock condition surveys;
- cost of deep retrofit requires investment that is disproportionate to that spent on other properties in their stock;
- grant opportunities are not able to be aligned with internal budget commitments;
- capital for improvement works within existing budgets is limited or does not exist. This has impacted on the scale of some bids for the SHDF Demonstrator as, although properties could be identified and works could be designed and costed, match funding was not available to the stockholder in the required delivery period.

**Agreed common methodologies:**

- greater clarity required for common methodology on assessment and evidence of outcomes.

**Time to secure data and develop decarbonisation pathway, respecting current asset management programme:**

- stockholders commonly advise they are two years from finalising their decarbonisation plans due to the current drivers of meeting regulatory compliance targets;
- one stockholder reported a timescale of five years to complete their compliance works investment.

**Staff capacity:**

- insufficient staff;
- lack of energy managers.

**Covid 19 restrictions:**

- working inside homes;
- engaging with tenants face to face.

**Supply chain capacity:**

- rising material costs e.g. 15% increase in the price of timber;
- increasing lead times with up to 19 weeks for roof tiles;



- potential impact of Brexit on both;
- staff on furlough as access to homes is not possible for general works.

**In particular, emerging barriers include:**

- the move to electrification of heating is not recognised yet in EPC points and is a threat to value for money for investment currently;
- uncertainty about the relationship between EPCs and kWh/m<sup>2</sup>/pa targets and how to evidence improvements in space heating performance resulting from energy efficiency investment;
- factoring retrofit works into long-term financial planning;
- issues with achieving NZC for hard to treat, rural, listed properties and properties in conservation areas; and
- permitted development and planning – e.g. Walsall has limited depth of EWI to 105mm on front elevations.

**In more detail:**

- lack of in house staff with expertise in energy;
- assistance with rural or hard to treat properties, including legacy of non-traditional stock e.g. LPS that is expensive, diverts resources and needs to be eligible for future rounds of SHDF;
- absence of initial available funds for the preliminary staff time to investigate housing stock;
- no dedicated officer support, many of whom are having to service this in addition to their main responsibilities, including fire safety work post-Grenfell;
- concerns over building safety versus energy efficiency have been raised;
- where EPCs are missing, it has been highlighted that some of these properties might fall under the qualifying criteria, but there is a cost involved in undertaking the EPC calculations;
- issues have been raised regarding capacity of installers and when uplift can go ahead;
- concerns regarding the management of retrofit works, including lack of expertise in evaluating the effectiveness of retrofit measures; and potential disruption to tenants, and the costs and capacity involved in transferring of tenants out of properties during works;
- assistance with post installation tenant engagement needed;
- the term 'Net Zero Carbon' and what this means on a retrofit basis, how this might be modelled, and how this relates to an EPC based target;

There were numerous requests from social landlords regarding support, with many actively seeking additional funding for future improvement plans. One has applied for funding under the demonstrator fund but has been unsuccessful. The main requests are relating to financial aid. Assistance has also been requested in determining the best available approach to energy efficiency improvement and understanding whole house retrofitting measures on a wider scale.

## GENERAL FEEDBACK

The consistent barrier that was brought up was financial aid and funding issues to complete in-depth stock analysis. The social landlords were concerned that their budgets were tight, and that they didn't incur extra expenditure as business plans were already completed for the next financial year.

Questions included whether there is flexibility to fund associated enabling works (such as asbestos, electrics, damp, ventilation etc.), and funding of ancillary works or works that are required to be made to the home to enable provision of decarbonisation measures (for example issues with hoarding etc.) as part of grant funding.

There were barriers raised in determining the best available approach to energy efficient improvements as each dwelling is different and each requires their own unique pathway. This comes down to cost issues again, as well as



staff time and finding surveyors to carry out the task. It was highlighted that the capacity of surveyors is currently an issue. There are, however, potential cost savings by rationalising surveys for different purposes.

Barriers exist in addressing detailing with neighbouring properties, where retrofitted properties adjoin another that is not owned by the social landlord. This applies to low level housing units but also to blocks of flats with multiple tenure types. It may be difficult to persuade all the tenures to participate in energy uplift should a measure have been identified which crosses over boundaries (such as external wall insulation). There could be issues with thermal bridging, damp/water ingress, or potential damage, etc. should improvement plans be carried out.

Issues were raised with improvement plans causing future issues. For example, where tenants move out and a new tenant is placed during retrofit delivery and they refuse the works or have a differing situation, e.g. their needs and capabilities.

The stockholders' admitted lack of technical expertise, understanding what to do with the data identified, and that there may have been previously missed opportunities due to said lack of expertise is a barrier, as is that of the move to electrification of heating not yet being recognised in EPC scores and is thus a threat to value for money for investment currently.

Many stockholders were concerned about repeating previous mistakes arising from the launching of funding programmes at short notice, with short deadlines for bidding and project delivery end dates being set during the winter (when works such as EWI and heating replacement should not be carried out).

## DISCUSSION TOPICS

The following were also explored:

1. Number of properties that stockholders would retrofit in a single project if they could find the funding/match funding such that the constraint becomes procurement and project management rather than funding.
2. How stockholders would manage deep retrofit involving significant disruption such as insulation of solid floors. What capacity is there to manage and fund 'decanting' and how many properties would this involve compared to undertaking deep retrofit of voids.
3. What the reality is of the different timescales between installation of heat pumps and subsequent appropriate levels of insulation. How might tenants be supported during any lag between the two to manage their energy bills? How do stockholders design heat pump systems such that they are fit for purpose, and ultimately without there being a risk of high bills for tenants until such time as insulation installed.

Confirmation is still requested on the term 'Net Zero Carbon'. It should be noted that EPC 'A' has been used as a proxy for NZC, as NZC was unable to be modelled in the RdSAP Software.

It should also be noted that renewable technologies are likely to be required to achieve Net Zero Carbon, which causes limitations in itself, including grid connection issues (can the grid handle the capacity?) and also where hard to treat, listed properties or those in conservation areas cannot have renewables easily applied. Hard to treat properties could for example be those that might not have the roof space for photovoltaics panels. This would mean that there would be a percentage of the dwellings identified that could not reach NZC.

Advice on issues impacting on decision-making regarding a 'no regrets' pathway e.g.

- step change from gas to electricity – to meet the Government's proposed plans to move away from fossil fuels, this has come in the form of ensuring the heating systems such as heat pumps do not push tenants into fuel poverty inadvertently. This would need to be a measured change from fossil fuels to ensure that investigations are carried out post-retrofit.



Department for  
Business, Energy  
& Industrial Strategy



West Midlands  
Combined Authority



- Healthy Homes – it has been highlighted that tenant health and comfort needs to be addressed post installation, that homes do not attribute to health conditions, so ensuring that appropriate ventilation measures are included and post works energy management and monitoring need to be designed in.

**Other issues raised:**

- Financial concerns are raised as a barrier to long term planning decisions.
- Problems have been raised with neighbouring properties, where they adjoin the property being retrofitted, causing thermal bridging issues, damp/water ingress, potential damage etc.
- Concern by neighbours on the impact of the works on the building aesthetics and potential negative impact on the value of properties not retrofitted.
- Displacement of tenants during works – would retrofit only suitable when properties are in ‘void’ between tenants.

Interviewees raised a number of queries and requests for further information or funding/resourcing support. These included:

- challenge of identifying measures that can go to EPC C and go to net zero without further modification;
- time taken for familiarisation with new approaches and tools;
- eligibility criteria set at below EPC C for grant support is an issue for some archetypes such as flats (and others) where it is clear that they should be insulated as soon as possible. For example, being on gas and having gas heating, having PV panels etc. gives falsely high EPC scores in terms of decarbonisation aims.
- securing State Aid clarifications on grant eligibility is costly, time consuming and have an uncertain outcome.

The project raises issues around whether there needs to be a focus on costs for certain criteria for properties, rather than simply on archetypes. This can help inform where investment needs to go to stimulate markets to address challenges and guide value for money in investment. The project explored these questions further as it progressed.

The ability to cross-reference work in social housing providers to one another would help benchmark costs and identify where improvements to reduce spend or better use investment may be possible.

A Customer Relationship Management tool (CRM) being developed in the West Midlands is intended to help improve the reporting of data leading to better prioritisation of householders supported and measures and technologies chosen.

Rigorous monitoring is required to help understand what works for the building and for the person. This is currently prohibitively expensive for most stockholders and any system has dependencies including connectivity, e.g. power not being disconnected / batteries being replaced etc. Monitoring should include indoor air quality as well as moisture and temperature. This would allow the adequacy of ventilation to be checked and pick up any issues of CO and CO<sub>2</sub>.

There is not a widespread appreciation of the relationship between energy performance of homes and net zero targets. Clarification has been asked for regarding the terminology of ‘Net Zero Carbon’ in relation to retrofitted properties, and whether this should only include regulated energy usage as per the Government’s SAP Model or whether it needs to include unregulated energy use, such as from appliances etc. Information on how to demonstrate Net Zero Carbon and the methodologies required to show comparable data is required.

Business as normal is defined by EPC and SAP rating metrics. These metrics are the appropriate ones for an EPC C target or an affordable warmth target, but they are not the appropriate metrics for a zero carbon target. Housing providers need to reconsider the metrics that they use and to move towards kWh/m<sup>2</sup> per annum values.



## FUNDING GAPS AND BIDDING

Match funding is the cost barrier, and will become more of a barrier in future years. 60% match funding as in SHDF will be unrealistic. Diversion of resources to fire safety is a barrier: if this was government funded, then it would release RP funding for whole house retrofit. The pressures of competitive bidding for funding result in the supply chain becoming a barrier – short delivery timescales are unachievable when key contractors have full order books for nine months, resulting in poorer quality services being commissioned. One respondent commented that they would like to recommend to BEIS that future funding rounds should have more realistic timescales for delivery and guidance that makes it clearer to stockholders on the scope of the funding rather than inviting the bidder to make all the running.

c. Please describe any specific barriers faced within the Energy Hub in relation to the delivery of this project

Not applicable

d. Has the COVID-19 pandemic had any effects on your project, and if so, what? How were they addressed?

Overall, it is perceived that face to face meetings would have been beneficial. Whilst virtual meetings saved travel time for event attendees and research team members, drilling further down into data might have been easier while on site with a landlord. Several interviewees promised data but proved to be too busy to follow up on an initial meeting.

One landlord identified that their stock assessment surveys were planned to go ahead at the latter part of last year and into this year (2021). COVID-19 prevented access to buildings as it was deemed too high risk – and, as such, their stock data could potentially be out of date. They are reasonably confident that the data have not changed significantly since their last assessment. The planned surveys have been moved to later this year (2021), using a more intricate system which will allow a more comprehensive input.

## 5. Tenant Engagement (if applicable)

a. Please provide a summary of any tenant engagement that has been undertaken by the pilot partner organisation and its reception.

### Project Objectives

This project did not seek to directly carry out tenant engagement but did set out to establish the range of tenant engagement approaches and examples of good practice from interviews with landlords.

One organisation representing a group of tenant management organisation attended a briefing event but did not engage further. The points below have been gathered in a series of interviews with landlords.

- Tenant engagement across the RPs is completed prior to any uplift works. This is done through letters and response work, direct contacts and also home visits. As social landlords do not want to engage with tenants regarding non-confirmed work there has been no engagement during this pilot over the uplifting of EPCs. One exception has been found to this where estate regeneration proposals are discussed at pre-concept stage and tenants are fully involved in decision-making.
- If funding was secured, tenant engagement would commence then. There have been discussions over how to go about this, with tenant forums and questionnaires being flagged as good options.

### Project Findings

Landlords report that Covid 19 restrictions have impacted on face to face tenant engagement. There is hesitancy both by staff and by residents to carry out even some essential repairs within homes. This has had a dual outcome of some delays to planned stock/home surveys but has also stimulated protocols for safer working that might assist in informing new methods of tenant engagement and wider tenant responses and levels of engagement.



Overall it was found that the level of routine tenant engagement activities were limited and the extent of engagement varied considerably. Some stockholders had some degree of engagement with tenants but only regarding set development plans whilst others took a fully inclusive approach to bringing tenants into decision-making, particularly concerning estate redevelopment. However, those landlords engaging most with this project have strong tenant engagement activity and learning to share.

Where stockholders have E, F and G properties, this was generally due to tenants refusing upgrade works historically and current tenant engagement approaches did not seem to be able to overcome the concerns of vulnerable tenants. This then leads to stockholder belief that there are issues about getting 'buy in' for initiatives such as LAD.

There is also tenant feedback on surveys before planned works that, despite EPC levels of high Ds and Cs, some tenants still experience significant discomfort due to draughts, cold, damp and condensation, fear of energy bills and difficulty in heating their homes. Most landlords are not effectively capturing this level of comment on discomfort before they become disrepair claims. This issue of EPCs not representing true levels of tenant comfort and ability to manage is critical when designing future energy efficiency retrofit project funding, design and delivery.

Overall, there is concern about how to work with tenants on decarbonisation planning, particularly with the replacement of gas, solid fuel and woodburning stoves as it is challenging to co-create future solutions with tenants without raising hopes or seeming to make commitments about something that may not be delivered.

There is an ongoing debate about mentioning bill savings as a result of retrofit. Whilst most practitioners will not engage in a discussion about bill reduction there is some feeling that a tangible benefit needs to be identified.

The WMCA Fuel Poverty and Regional Retrofit working group on community engagement is examining the issues of both tenant engagement but also the wider empowerment of communities to have a voice in planning for regeneration and large-scale retrofit projects. Learning will be shared in due course.

Responses range from:

- Currently, no investigations into tenant engagement has taken place, however there are plans to approach this in January 2021. Recent discussions over tenant engagement has highlighted concerns over tenants rejecting plans and a hesitancy from housing providers to offer tenants opportunities for improvements if there is not complete certainty that they can be provided, (i.e. offering tenants the opportunity to comment on energy improvements to their homes if these cannot later be delivered due to unavailable funding).
- Ad hoc engagement around particular projects with consultation being more about disruption rather than about objectives of scheme with little training on new technologies and how they operate.
- Existing Tenants' panel are informed about progress on current energy efficiency targets.
- The Birmingham Route to Zero Task Force engages with wider community but not directly with tenants' representatives.

Interview responses confirmed that engagement tends to be written communication and open tenant meetings.

All stockholders report that there are some serial refusers of improvement works for a variety of reasons, meaning that there is a small clutch of low EPCs in most portfolios.



There are public and political concerns about redevelopment of housing where retrofitting works cannot be carried out which require very careful and timely communications as part of good practice within the duty to consult.

Post installation engagement is also key, to give occupants the opportunity to discuss any positives and negatives and to make sure that they know how to use any technologies that have been installed correctly. Post-installation evaluation and householder satisfaction are undertaken although this is dependent on funding and is generally limited to sending out feedback forms.

Good models of post works survey, engagement and support include the Green Doctor programmes where follow up advice is provided to ensure new technologies including heating systems and ventilation units are used properly. Some stockholders have limited expertise and resource to support post works follow up.

b. **If you developed improvement plans on mixed tenure blocks, please provide details of how this affected your planning.**

Most stockholders have mixed tenure blocks in their stock, often due to Right to Buy sales and therefore need to follow due process with regard to leaseholders. This raises issues of timescales (need to follow due process with leaseholders - issuing S20 before going to tender, etc.) and cost/cost recovery eligibility. To date, many landlords have chosen to fund leaseholder property upgrades rather than get the proposed project held up or derailed. Cost recovery and timing of consultation processes will be critical as the scale and costs of retrofit grow. This has been investigated by one of the stockholders already, and has been planned into financial works..

Many stockholders are reluctant to recharge leaseholders and have taken the route of moving forward on energy efficiency investment through giving due notice but not asking for leaseholder contributions. In some blocks where the right to buy proportion of leaseholders is high and where a portfolio approach is to be taken, the position of not securing a return on investment on leaseholder properties becomes less viable. The data that has been provided by one stockholder shows that their dominant archetypes are flats (in one example - out of the 447 properties identified, 232 are flats).

c. **Please provide insight into any issues that arose around tenant engagement during the TAF pilot.**

The project proposal included an ambition to be introduced to tenant groups by stockholders to run workshops and events to understand more about the best ways to engage in conversations about scaling up retrofit. This was not possible due to Covid.

Insights from this project include:

Temporary accommodation – difficult to engage with tenants in this situation regarding energy matters due to the short-term nature of their accommodation placement. Landlords do discuss and provide advice regarding residents' housing options, issues they are facing, and rental income. All clients who reside in temporary accommodation are vulnerable and will be experiencing financial issues which could have future impact or have already impacted on their ability to heat their homes efficiently.

Issues with neighbours not wanting works to be carried out to next door properties.

Residents often don't like change. 1-2-1 support is needed, and there is often a lack of understanding or trust in new products from residents, e.g. many like gas boilers for example over ASHPs. It was also highlighted that post-installation engagement needs more work.



Displacement of tenants: many RPs confirmed that improvement plans can only be carried out at void stage, which causes delays to being able to relet properties, consequent financial impact, and means a new tenant is delayed in being able to move. If major improvement plans are needed to be carried out during occupation then the tenant would need to be moved out of the property for the duration and be placed elsewhere temporarily – this not only causes a level of distress/disruption to the tenant but further cost implications for the landlord.

The move from gas to electric heating and hot water is hard to sell / promote to residents.

Problems faced in the past with tenant engagement were discussed which included tenant refusal, and homes that require ancillary works prior to install such as clearance of properties to install works. Tenants' right to refuse works could cause issues where improvement plans are being carried out on properties in close proximity. If one tenant refuses, it means that the property is left without measures being completed and delivery of plans are delayed. This has been identified as an issue with all stockholders. This does not mean the improvement plans would not be undertaken – but they would have to be undertaken at a later date – and may not meet funding deadlines or potentially result in more financial restraints.

**d. Please provide insight into what you found to be the best approach(es) when engaging with tenants**

Social landlords confirmed that letters and home visits were the best approach that they currently use to directly engage with the tenants. However it was highlighted that events and tenant forums are good platforms for tenants to discuss their thoughts and issues.

#### **Third Party Insights**

It was noted that TPAS <https://www.tpas.org.uk/> reported at the Retrofit Challenge conference on 3 and 4 March 2021 that their recently convened tenant roundtables found that the participants did not have models of tenant engagement consultations to share regarding retrofit proposals.

Landlords reported a range of practices regarding tenant consultation and engagement with some interviewees stating that their organisation did not really have strong programmes. Others felt their tenant engagement, particularly at the outset of estate regeneration and large-scale energy efficiency programmes, was well managed, with tenants having a strong role in the process and some being involved on design and procurement panels.

Whilst not part of this research, the experiences of the NCH Energiesprong pilot, working in depth with a small number of households, which formed a distinct community, suggested that meetings held locally, in venues where access felt comfortable, including in residents' homes, at times such as evenings, were found to be more convenient and welcoming and were well attended.

The Energy Systems Catapult has a consumer insights team <https://es.catapult.org.uk/capabilities/consumer-insight/>

Research into working with tenants carried out some years ago by Government still remains of value:



## EXAMPLE OF RESEARCH REPORTS

DECC review [What works in changing energy using behaviours in the home?](#)

BEIS guidance for how to influence behaviours as part of smart meter roll out <https://www.gov.uk/government/publications/best-practice-guidance-for-the-delivery-of-energy-efficiency-advice-to-households-during-smart-meter-installation-visits>

A DECC review of behavioural trials, again around smart meters [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/407573/10\\_Behaviour\\_Change\\_Trials\\_Reports\\_-\\_Synthesis\\_Report\\_FINAL\\_for\\_publication.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/407573/10_Behaviour_Change_Trials_Reports_-_Synthesis_Report_FINAL_for_publication.pdf)

A DECC review of different ways of looking at energy behaviours [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/48256/3887-intro-thinking-energy-behaviours.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48256/3887-intro-thinking-energy-behaviours.pdf)

Behavioural insights team have a summary of their work on energy behaviours <https://www.bi.team/what-we-do/policy-areas/environment-sustainability/>

[SHAP Maximising Outcomes from Investment in Domestic Retrofit - https://shap.uk.com/resources/resources-2018/](https://shap.uk.com/resources/resources-2018/)

## New Approaches to Virtual Consultation in 2020

Keele University working with the New Vic theatre in Newcastle, Staffs are partners in one of the Innovate UK Smart Local Energy Systems projects, leading on user-centric design. Their unique animation approach to community engagement has had to go completely online due to the Covid 19 restrictions and they have had some interesting outcomes from their social media led consultation and workshops. <https://www.facebook.com/engagezcr/>.

The Zero Carbon Rugeley project continues to March 2022 and the consultation and engagement with Rugeley residents is intended to inform the final solutions proposed for developing a Smart Local Energy System ready community, with retrofit of existing housing a key element alongside energy system transformation and low carbon mobility options.



- e. Please provide an insight into whether the Covid-19 pandemic affected tenant engagement during the project, and if so, what affects it had and how were they addressed?

COVID-19 has affected tenant engagement in the broader sense. It has been difficult for social landlords to make home visits and undertake surveys for work needed. There is now a backlog of works, which have been rescheduled.

## 6. Landlord Engagement

- a. What was the level of appetite for landlords to take on the Pilot scheme (i.e. did demand outstrip capacity of the project or was there a low appetite)?

There was a high level of appetite for the pilot, with many landlords wanting to take part. Many were interested in the scheme and what it potentially has to offer in the future.

### **Marches LEP**

Of the 13 original invites that went out, there were seven replies with EPC data and two further replies as part of the round tables as well as the original seven. Among those that didn't respond were the Almshouses. However there would still be future opportunity to include properties like this for energy efficiency improvements. Almshouses are a perfect example of properties which can be hard to treat and are often energy inefficient so shouldn't be overlooked. They could potentially have increased funding pressures, or didn't manage to respond due to a number of reasons, such as tight timescales or lack of funding available.

Looking at the available information for the Almshouses, they range from 1600s Wattle & Daub, timber framed dwellings to mid-Victorian, mock-Elizabethan sandstone properties, most of which a Grade I or II listed. There is very little EPC data on the properties; those that do have EPCs are low D or E ratings. A Grade II\* listed almshouse in Shropshire, consisting of limestone, tiled roofs and casement windows have E-G Ratings. The listing status of the properties does affect the retrofit and energy improvement options for these dwellings.



There are a number of providers wanting to get to “C” but there is a reluctance to revisit these works by 2050 and are therefore keen to avoid duplicating spends. On the flip side there are many providers that simply cannot afford to achieve net zero in one step.

Whilst insulation and solar power are key elements, it is recognised that they alone are not sufficient. There are uncertainties around gas/hydrogen alterations, capacity of the electric grid, and the cost implications to implement these strategies. Work is currently being done to establish a “no regrets” policy/pathway and how that will impact planning. There are some supply chain issues at present, with concerns over quality/materials.

There are a number of different localised drivers ranging from:

- Decarbonisation
- Addressing fuel poverty
- Net present value – of stock
- Energiesprong – the financial model has been useful but does not include feasibility and design costings, which are particularly high per property for small pilots.

Challenges include:

- insufficient data, software can get some of the answers but does not provide an off the shelf strategy to implement. Companies such as Saville’s are now offering a full service to develop decarbonisation strategies with other companies offering bespoke support.
- in addition to the works there are costs associated with collating the data, the strategic analysis of the data and the costs to educate tenants.
- whilst some organisations may proceed with the data based on archetypes, this is only possible when achieving a “C” and archetypes are less helpful when considering net zero due to the variations from one house to another with the same archetype, rendering any standardisation useless longer term. This poses another challenge for providers. i.e. it is possible to put in a boiler that will last 15 years and achieve EPC C, but this wouldn’t be an option for net zero as it ought to be a heat pump installed but which would have a shorter lifespan.

Many providers are concerned with:

- Lack of staffing
- Funding
- Experience to oversee and deliver the programme
- Compliance is taking priority
- Affordability vs viability
- Supply chain

There is a growing business case to implement retrofit to boost the standards which in turn will reduce void times and disrepair claims, increase quality and less money spent on housing visits to educate tenants on condensation issues.

Other concerns nationally are the sheer variety of stock i.e. in London there are properties in conservation areas. Many similar research questions have taken place over the last decade with little action to date. There is evidence that there needs to be more of a steer centrally. The gap between providers is likely to increase. Those who are already implementing retrofit for example have access to the supply chain and a clear direction enabling them to utilise the funding available. Those without the financial means to implement or without the existing supply chain are likely to take longer, which actually means they will need to implement a larger volume of works in a shorter timeframe.



A sample interview with an organisation supporting stockholders in their decarbonisation planning has provided an insight into widespread experiences reported nationally.

- Most stockholders have only been considering data analysis for decarbonisation for 18 months or so.
- Data quality and paucity are an issue - data are generally held in several places and it can take a considerable amount of resource to bring it together before analysis can start.
- The quality of data generally means it is necessary to do a detailed analysis of the archetypes of priority focus, including full SAP modelling.
- Even once data has been gathered, the sector is so busy it can be difficult to get strategic meetings timetabled.
- Tools such as SAVA Intelligent Energy and Parity Project Portfolio offer property based analysis which offer longitudinal stock management support. However, they don't in themselves provide the detailed analysis that identifies strategic approaches, challenges and barriers. Additional assessment is required to support strategic decision-making related to a stockholders corporate approach to investment and acceptability of measures.
- Future proofed decision-making regarding gas replacement heating systems is a concern due to the most appropriate solution and its costs.
- Costs to address the whole social housing stock are likely to be £38bn or more.

**b. How many Landlords were involved in the TAF pilot, and how were the landlords suitable for the scheme identified?**

Thirty landlords were involved in some depth with the TAF Pilot overall. Further landlords were invited to and attended on line meetings.

Stakeholders included Social Housing Providers (SHPs) but also non stockholding Local Authorities, energy companies and housing sector supply chain organisations.

Stakeholder awareness raising and engagement was carried out through introductory events by LEP for 4 West Midlands LEPs, through attendance at prearranged meetings and through invitation to smaller 1:1 and peer group meetings. One nationally advertised webinar was also held in February.

**c. Of those landlords involved, what proportion were small (<1000 homes)/ medium (1000-10,000 homes)/ large (>10,000 homes)? Please provide a brief breakdown.**

Sizes of SHPs engaged: 30 in total	Total
Number of Small RSLs < 1000	4
Number of Medium RSLs 1000-10,000	6
Number of Large RSLs >10,000	20
Non stock holding LAs with some emergency accommodation or other interest	3

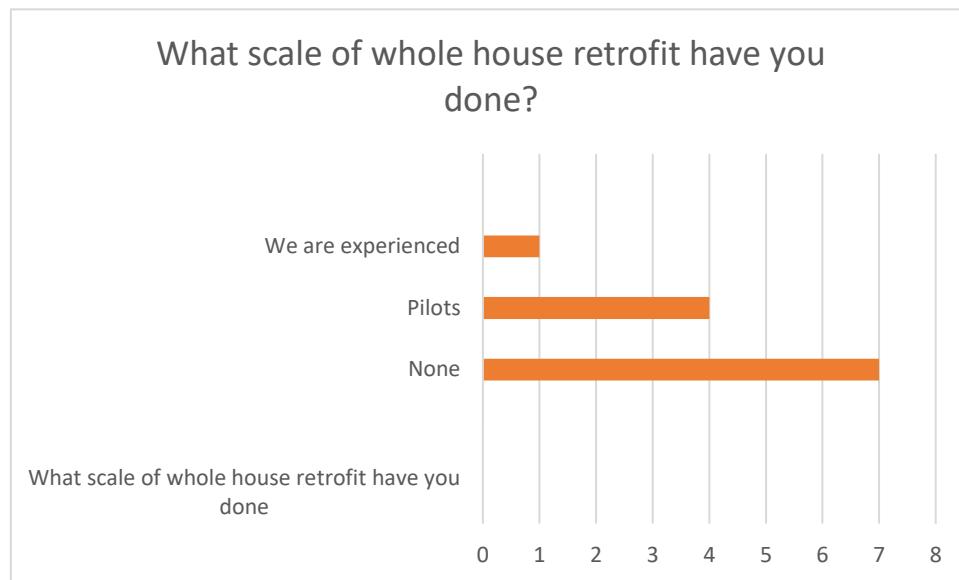
**d. Of those landlords involved, how many had experience in retrofitting<sup>2</sup>/ were new to retrofitting?**

<sup>2</sup> I.e. energy performance improvement plans to existing stock



The most in depth engagement was carried out in the Marches LEP. Of the 9 SHPs involved only 2 were new to retrofitting, the rest were building stock improvement plans.

Separately, 12 SHPs replied to an online poll



- e. What proportion of landlords who took part in the Pilot were involved as part of a wider decarbonisation plan (e.g. with an end goal of retrofitting stock in near future), compared to those who were involved but didn't necessarily have future retrofit plans?

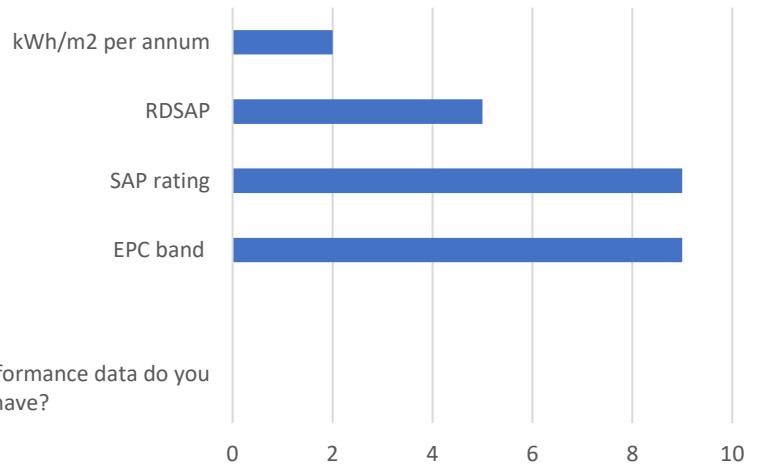
Out of 9 SHPs with stock in the Marches LEP who engaged with the research , 7 had future plans for decarbonisation / retrofit works, 4 were already considering Net Zero Carbon as the end goal and only 2 didn't necessarily have plans in place but had highlighted it as needing investigation.

Of the 30 SHPs the project worked closely with, all were aware of the drivers for decarbonisation of their stock. Thirteen were involved in development of SHDF bids. The remainder were intending to start decarbonisation planning once they had completed their current compliance investments.

The level of data collection and cleansing varied amongst SHPs.

From poll responses by 12 SHPs, there is a spread of data being collected and collated with requests for briefings on what is required to adequately support a decarbonisation plan.

## What energy performance data do you have?



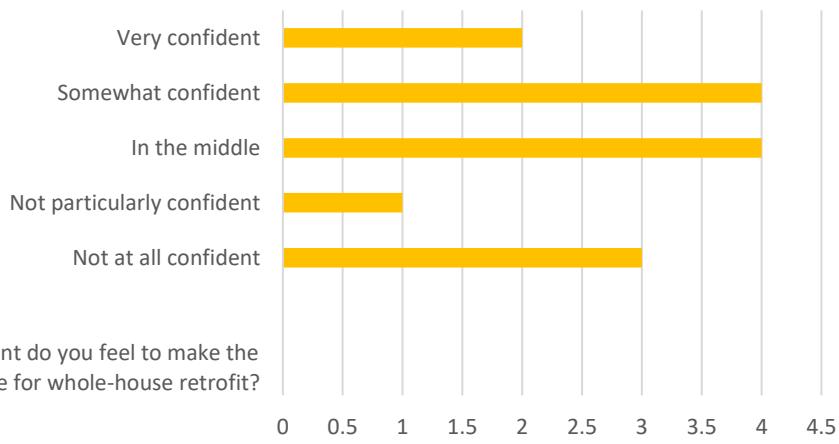
### f. Of those landlords who had wider decarbonisation/retrofit plans, how much resource was already allocated to the decarbonisation of their stock? (if known)

In the Marches LEP, 4 already had resources allocated to wider decarbonisation plans, however how much is unknown, and all of these 4 had built this into future budget planning.

Overall, few SHPs have dedicated teams. Most respondents were concerned that energy planning is being added to their roles without additional resourcing. All SHPs were interested in help in terms of information and grant in order to move forward on a 'no regrets' pathway.

Of the 12 poll respondents, there was a range of confidence in moving forwards on decarbonisation planning and a request for resource.

### How confident do you feel to make the business case for whole house retrofit?



## What technical support do you need?



## 7. Suppliers

### a. How did you identify possible suppliers and funding streams available to social landlords?

Social landlords and their trusted partners such as energy advice agencies and two large energy companies were interviewed directly and via online survey to establish which installers they were working with. A supply chain interview exercise was then carried out. All interviewees were aware of a range of funding streams.

### b. Did you/ Will you undertake any assessment of the supply chain in your area as part of this Project, and if so, what did it entail and what were the results?

As part of wider funding streams, an assessment has been carried out with regard to the supply chain in the West Midlands. There are currently capacity issues within supply chains, due to multiple factors – interest in other funding streams has led to limited spare capacity, COVID-19 has slowed down production/ created a back log of installations/ caused delays in surveying etc. Issues have been highlighted about the availability of local installers due to demand.

### c. Please outline the availability of suppliers (if engaged) to deliver your plans to improve social housing to EPC C, and to set housing on a path to net zero.

Research through surveys and interviews with stockholders, energy advice agencies and large energy companies confirmed that many installers have very little capacity at this time. There has been some ongoing impact from putting contractor teams, including bid teams, on furlough. The reduction of manufacturing of materials, products and components due to Covid 19 restrictions globally continues to have an impact on supply and lead times. This is currently compounded by Brexit with goods held up at UK ports. Mitsubishi has an 18 month waiting list for heat pumps. There are long lead times for Dimplex Quantum smart electric heating. Tiles and bricks have a long lead-time. There is now said to be a shortage of sand due to the demand for manufacture of glass vials for Covid vaccines.



Many companies have chosen not to engage with the GHG vouchers scheme because of the short pipeline timescales (before recent extension); because of the ‘already fingers burnt’ experience of gaining accreditation but not getting the work or return on investment. Whilst smaller installers can see the benefit of quality assurance and Trustmark/PAS 2035 they can currently find guaranteed work with home extensions and garage conversions, for example.

Current experience of contracting for multi-property projects by open tender or use of frameworks will be captured and reported in early 2021 as a result of contracting by the SHDF Demonstrators and LAD projects.

Capacity and supply issues are still an ongoing issue. The supply chain will respond to longer term pipelines – including training providers and construction companies. The new government apprenticeship funding allowing several different employers to take an apprentice through their training period should help.

Surveyor capacity issues have also been identified as a problem. This could cause issues with improving to EPC C. Net Zero Carbon is a long-term plan for most RPs and therefore capacity issues could be built in from the beginning. Early movers already have Retrofit Coordinators and Retrofit Assessors in post but many stockholders do not yet have dedicated teams.

**d. Please comment on your perceived current state of the retrofit supply chain in your region, and outline any barriers posed to landlords in your region as a result of supply chain capacity and capability.**

There is a good level of local installers. However, potential barriers could come from finding those that have upskilled enough workers to carry out to capacity. We are seeing more and more of the supply chain now acquiring the support of Retrofit Coordinators and Assessors both in-house and third party to give guidance on retrofit works.

Procurement capacity and supply issues have been highlighted elsewhere in this document. Whilst it is necessary to undertake effective and in-depth procurement procedures, these do cause delays to works and added costs. Many suppliers are finding that by the time they have navigated through procurement their capacity and availability has altered. Currently this is due to delivery of LAD and GHG voucher schemes.

There is interest in consortium approaches to procurement. Several interviewees are members of the CHIC procurement consortium, through which contractors are available who can install whole house retrofit measures. Suppliers are available through Birmingham City Council’s supply chain: however they have full order books and therefore projects with short timescales are unrealistic.

The feasibility of reaching net zero will become clearer when one stockholder publishes its Net Zero Carbon Investment Plan. Queries relating to definition of net zero carbon have been highlighted elsewhere.

## 8. Scalability

**a. How scalable do you believe the approach taken for your project is, and on what type of properties?**

Our approach had several stages, some are scalable.

1. invitation to engage – we held workshops, 1:1 interviews and meetings, a large publicly advertised event. Each had different outcomes. However, the best results came from personal relationships and these were essential in securing time with overstretched individuals being expected to respond to competing pressures and demands on their time.



2. Detailed engagement including stock modelling. This is organisation specific and there are multiple service providers if funding is available from organisational budgets or by other means.

To EPC C the approach taken here is scalable as EPC uplift measures are identified at stock survey stage, which can be undertaken for the majority, if not all properties.

Net Zero Carbon is more difficult as already discussed RdSAP is not a suitable tool for modelling NZC. There are also a lot of rural and hard to treat properties within the Marches – especially where they fall into conservation areas, are listed or a complex build-up.

Appropriate approaches to modelling NZC – it would be helpful to have a toolkit to appropriately model NZC to give more accurate figures.

3. provision of technical advice and guidance online is requested and completely suitable to provide support at scale.

**b. If your approach taken in this Pilot (energy stock assessment and energy performance planning to EPC C) was applied across your region, what is the anticipated cost to apply this method across applicable homes?**

Trustmark - £2,400 per organisation (to become Trustmark Certified)

PAS2030 - £500 - £2,500 per accreditation dependant on certification body

PAS2035 – Retrofit Assessor training £600, retrofit coordinator training £1,300 (per person)

Cost for stock assessment tools

- Cost for collation and cleansing of data – The cost for this will vary dependant on each stockholders' knowledge and database of their stock's current energy efficiency and the data they have available already.
- Indicatively £5,000 per annum per average sized local authority for all tenure stock assessment
- Costs per property owned by a SHP for a stock assessment tool licence – approx. 70-90p/unit (cost reductions if purchase licence for more than one year)
- Production of a strategic stock decarbonisation plan using stock assessment tool outputs and wider stock condition survey and corporate planning information -- anything from £15,000.
- Staff time – 6-7% of total project costs
- Surveying costs – £75-£150 per property
- Cost for Retrofit Coordinator report per household – approx. £370.

A report that had been completed over 4 months on stock data analysis has cost in the region of £50,000 in total with staff expenses included. Other decarbonisation plan preparation quotes range from £15,000 - £20,000.

## 9. Lessons Learned

Please outline any lessons learned throughout the duration of the TAF pilot that could be used for future retrofit/stock assessment projects.

**a. What do you believe could have gone better during the project?**

We met our objectives overall. The methodology was appropriate. We did not engage with the 'hard to reach' smaller housing associations. We generated interest and demand for information and resources that were not directly available.



**b. What would you change when undertaking stock assessment analysis and energy performance improvement planning in the future?**

Using the RdSAP Software for modelling – there were too many assumptions that had to be made using the RdSAP Software and NZC couldn't be modelled. Only regulated energy can be measures, unregulated energy and householder consumption would need to be included.

It would be better to use a more in-depth analysis tool, however it has given a useful insight into potential measures and costs for energy performance improvement. For example – could look at SAVA, Chrome tool, or IRT DREeam. BIM modelling could also be useful here.

**c. What risks were identified during the project?**

**Staff turnover** – taking knowledge with them was highlighted by one of the stockholders, where knowledge is not shared and only one person understands certain procedures (for example tenant engagement pathways, then should they leave they take this knowledge with them).

**Supply Chain Capacity** – more demand on supply chains causing delays and could result in pushing prices up.

**Covid-19** - current pandemic has meant that surveying of current housing stock has been put on hold by most RPs except for emergency circumstances. This could quickly become a lower risk due to the vaccination programme and COVID procedures from RPs.

**Cost Variations** - a key aspect of achieving cost-effective retrofit is through accurate cost planning. However as each dwelling needs to be assessed on an individual basis, there is an element of cost of measures fluctuating.

**Product emergence** – using a product or technology that is novel or part of an immature market could lead to issues with whole house retrofit, such as poor installation – this is something that needs to be kept in mind when deciding options. Upskilling of workforce and suitable training would be beneficial here. It would also help to encourage the ‘no-regrets’ pathway.

**Grid connectivity; AHSP and GSHP needs to coincide with PV** - grid reinforcement will likely be required and roofs are not always suitable for PV installation. Need feedback on what is working or not - have outcomes been achieved beyond EPC improvement. It is hoped that by the time connections need to be made to the Grid that it will have been reinforced ready.

**Building Safety vs Energy Improvement** – there have been concerns raised with fitting energy improvement measures as well as meeting building regulations and due diligence to safety of occupants (Grenfell being the subject raised).

**Stockholder capital works already programmed in** - there is little scope to add to works, as budgets and programmes are already committed. Most stockholders have budgets for cyclical repairs, maintenance and reactive repairs. They now have compliance requirements such as addressing fire risk, legionella on top of this. There is little scope to add new budget lines. Long term programme planning will need to be reviewed.

**Supply chain already committed.** - supply chain already stretched by Covid-19 with some workforce still on furlough as internal planned works not possible. Supply chain interviews confirm that smaller installers who are not already Trustmark accredited are not interested as Covid-19 has given rise to steady work without huge bureaucracy



**Training and skills** - lack of capacity to scale up, training bodies are struggling to recruit staff as the construction sector is very busy. Training bodies need to prepare training course and secure venues, which currently is difficult with the majority not undertaking face to face training. Causing a lack of confidence in the pipelines.

**Tenant response and engagement** - lack of prior communication/awareness of work and its purpose; interest in agenda and inclination to complete survey; difficulty or barriers to completion or return of paper or electronic survey.

**Political factors (such as Brexit)** – material cost rising, goods retained at ports, lack of available materials as supply chains are disrupted.

**Unintended consequences** – the risks from unintended consequences from retrofit measures need to be identified pre-installation so the correct course of action is chosen, this is important on a no-regrets pathway.

**Knowledge Risks** - lack of project management skills, lack of training, lack of knowledge at a senior level, experience to not go with wrong models – this is when major errors occur.

#### d. What would you change when undertaking a similar project of this scale and size in future?

Longer timescales would give opportunity for more in-depth research.

Dissemination of findings is imperative to keep interest and engagement.

Immediate launch of resources – online, small funding pots etc would be beneficial.

#### 10. Need//Opportunity Identified

Outline any opportunity or need from social landlords which has been identified from the Pilot.

The main learning to date is that the stockholders engaging have programmes in place to determine the decarbonisation pathways for their stock and have some data to share and will share further data over the course of this TA pilot. There are many opportunities to support all social housing providers in planning for and delivering the decarbonisation of their stock.

- Funding for in-depth stock analysis.
- Parameters set for Net Zero Carbon and how this might be achieved.
- Longer time frames needed to respond to and deliver grant funded projects.
- To know at what point getting to NZC becomes negative gains for RPs.
- There is a need to develop and re-inforce UK wide supply chains.
- Briefing on air pressure testing methodology for existing housing stock.
- Listed buildings and conservation areas – need help and advice from planning departments and conservation officers to allow for energy improvement measures for buildings in these areas.

Guidance on energy performance evidence methodology and clarification on impact of heating systems on energy performance outcomes as determined within the methodology.



Recognition that stockholders with programmes to determine decarbonisation pathways for their stock have different timescales for this work to be completed but immediate delivery is driven by compliance / regulatory requirements. Realistically, delivery is some time away and this fits well with building supply chain capacity. Currently, work on site is still restricted by Covid 19 with some (framework) contractors still having staff on furlough as work inside homes is still on hold except for emergencies and repairs. A timescale of 1 -2 years to develop decarbonisation pathways before starting largescale capital delivery should be considered, allowing time for supply chain capacity to be built and jobs created to be sustained as forward pipelines can be confirmed with confidence around finance, delivery of required outcomes and capacity to deliver. The ongoing constraints of working within Covid restrictions should be factored in to largescale programme delivery.

The cost of producing stock condition data and EPCs for all properties is significant. Top slicing capital budgets to support widespread stock condition/energy performance baselining and assessment is emerging as a recommendation.

## **11. Future TAF Support**

- a. **What would be an appropriate forum for landlords to access future TAF support, for example a website, use of toolkits, webinars, networking events etc.?**

All of the above.

From the experience of this project, landlords respond to different opportunities which align with their preferred working style, workloads and drivers at the time which determine priorities for them and their levels of experience and resource.

Those furthest ahead in their decarbonisation planning are already commissioning stock assessment reports (e.g. Parity Projects, IRT DREeam, SAVA) and are working with consultancies such as BRE, Saville, Anthesis and Adeco to develop stock assessments into strategic plans. Budgets are in place for this and energy managers are likely to be in post.

Those aware of the drivers and beginning to think about timescales are accessing networking events, webinars and beginning to ask for service provider offers with a view to securing budgets. These landlords are seriously thinking about their long term business plan and asking questions to help with 'no regrets' decisionmaking. These organisations are likely to have staff who are picking this task up in addition to their day job.

Other organisations have been difficult to engage and have not responded to invitations issued in a variety of means and channels. It is assumed that day to day activities dominate and that smaller landlords in particular are less likely to have the critical mass of those interested and experienced to start working together to share thinking and move forwards on their decarbonisation planning.

All landlords have a churn of staff meaning that there is a cohort of new recruits who are keen to get to grips with both their new organisation and the growing focus on decarbonisation. They are keen to hear from leaders and to engage in knowledge sharing in non threatening environments where they can ask questions freely.

There is also a common request for clear guidance, regularly updated with information easy to find. A one stop shop with access to briefings, evidence base, real time discussion on key issues that will inform and influence decisionmaking and the opportunity to quiz those with experience along with signposting to where more in depth support is available (e.g DPS for decarbonisation tools and service providers) would all be of interest.



b. What do you believe future TAF support to the Social Housing Decarbonisation Fund (SHDF) should include?

**Headlines:**

A good, regularly maintained and updated website with information to help ‘no regrets’ decisionmaking.

Briefings, costed examples, real time discussion forum on key issues that are blocking decision making e.g. the energy system transformation

Funding for cycles of networking events – online and face to face plus site visits.

Resourcing of posts to provide long term support to landlords (and their wider communities) including:

A technical advisor hub – regional or sub regional

A dedicated point of contact at LA level – someone who knows the local players, local circumstance and local activity and can connect landlords at area level and by common interests, who can handhold and support knowledge sharing.

In more detail

1. Provide case studies on engagement with communities across all tenures – investment to net zero and depths of EWI required are a significant design and aesthetic challenge where not all homes will be invested in at the same time. We need to be much clearer about the outcomes of engagement with communities. Over what do they have choice or control and over what is it clear that they do not. This makes engagement more productive and rewarding for all.
2. Develop the finance models for all tenures that would support whole area retrofit programmes to proceed including retrieval of costs of demand reduction at sale of the property.
3. Produce worked examples of the impact on bills of electrification of heating and ongoing collection of evidence of impacts on residents in a range of scenarios including levels of insulation, support to residents throughout their customer journey and check-ups post works for 2 years, plus more thorough and repeated support for incoming tenants in future years to maximise benefit from low carbon heating and hot water systems.
4. Provide clarity on definition of net zero with any assumptions about carbon capture and storage and offsite mitigation clearly separated. A commonly used definition is that “the energy generated within a property or indeed the neighbourhood equals that required by their property or neighbourhood over a year. the ‘net’ in this case then simply refers to the need to use the grid as the ‘battery’ between summer and winter.”
5. Confirm heat demand reduction evidence methodology, for example by metering or monitoring in the property.
6. Develop guidance on tools available to support decarbonisation planning
7. Develop guidance and analysis of no regrets pathways particularly worked examples of investment to EPC C and investment to EPC B + grid decarbonisation and to net zero
8. Produce guidance on situations where archetypes cannot be brought up to net zero standard e.g. by achieving overall net zero in a geographical area or across a portfolio so that underperformance by some properties is compensated for by the high level of performance of other properties.
9. Provide life cycle financial and carbon costing for components including renewables technologies, hydrogen, new gas boilers as phase 1 of transition to net gas boilers as phase 1 of transition to net zero and fabric works
10. Develop guidance on addressing embodied carbon in retrofit materials and renewables technologies
11. Provide information about stock assessment tools and processes
12. Develop case studies on dealing with planning issues, tenant refusals, Right to Buy properties, leaseholders
13. Produce a fully worked case for impact on fuel poverty of move to electrification from gas, incorporating GHG emissions reductions pathway for 1 further cycle of gas (hybrid and hydrogen ready) boiler replacement compared to installation of renewables without adequate insulation or support on operating new technologies with some projection of kWh costs.



14. Investigate specific support regarding historic buildings, the most hard to treat and the stock held by smallest landlords e.g. Almshouses
15. Support awareness raising, capacity building and training for local authorities in their roles as facilitating area based schemes and in regulatory duties such as planning, building regs control and trading standards – leadership teams, offices and Councillors
16. Develop guidance on cost recovery including legal and commercial models for return on investment
17. Produce guidance on energy services options and billing
18. Immediately circulate guidance and case studies on delivery of new homes that are 'retrofit ready' where delivery of zero carbon new homes is not going to be achieved. E.g. for PV set out building forms that maximises south west to south east facing roof areas. For heating, install 22mm pipework not 15mm, possibly even 28mm.
19. Use the experience of designing and delivering zero carbon new build to improve processes and enable cost reduction for retrofit.
20. Support facilitation of ongoing 'communities of interest' knowledge sharing groups
21. Develop a single portal summarising available procurement frameworks, updated regularly
22. Support a regularly updated webpage on the total number of projects nationally, design features, products, number of units, any partnership working
23. Include a resource library with updated list of references and case studies by topic
24. Establish a coordinated technical webinar programme – repeated and modules targeted at all levels of experience
25. Develop of VR, AI and other technologies to improve accuracy of surveys, provide inspirational and experiential information to residents and support cost effective post installation monitoring with interrogation to avoid unintended consequences
26. Produce guidance on the most effective ventilation strategies, most acceptable to residents and in delivering properly ventilated buildings
27. Ensure easier access to longitudinal research findings from pilots, demonstrators and trials of products and materials – including a programme of return monitoring visits to projects carried out in the last 15 years

## 12. Additional Information

Please outline any other information that would benefit all parties, including detailed information on the results of the project, any recommendations you would make to BEIS or other pilot schemes for consideration supporting future retrofit and decarbonisation projects.

## HEADLINE COMMENTS TO FEEDBACK TO BEIS

1. For long-term ,high-quality health, wellbeing, carbon and other social and economic outcomes to be achieved from largescale retrofit there needs to be a shift in thinking from an asset management component replacement perspective to a whole home approach with the household at the centre of a strategy that marries regulatory compliance requirements with heat demand reduction and energy generation where possible. Dwellings are homes not assets and people live in them and survey, design, installation and maintenance must take this into account to support a high quality 'customer journey' and long term positive outcomes from the investment.
2. Clearly households flex over time and move around so no retrofit design for an individual property can be both completely responsive to the needs and lifestyle of the occupants at the time of survey and robust over time but known barriers to occupants successfully managing their home and energy consumption must be addressed so that they can enjoy a warm, comfortable, healthy home, starting with a fabric first mindset.
3. Whilst there is a very deep and long term experience of renewable energy technologies, for example, this is not necessarily widespread across all organisations. There are also significant concerns about lack of information to inform 'no regrets' decision making that would minimise the risk of investment in dwellings (including energy efficiency works) either precluding future improvements or requiring complete removal and renewal. Areas of



interest for further information sharing and training include: understanding of the characteristics of available data management and net zero carbon pathways modelling tools, proposed cost reduction timescales and energy system transition pathways and scenarios. The 'no regrets' principle has to be based on a whole house plan so that measures deployed fit into that plan and don't preclude reaching high targets later.

4. Many building blocks and components for effective retrofit to take place are falling into place but faster action is needed on a range of issues including the development of finance models and opportunities for procurement to drive change. There is still the need to identify mechanisms that the public sector can embrace that will speed up the development of these components. The idea of federal action between different L.A.'s still seems alien but would provide a more effective and efficient route to development of new tools, components and models than everyone starting from scratch on every component.

5. Time and time again throughout this research and in order interviews, reports and events over the last 12 months (and historically), it has been stated that the market will respond in terms of skills, training, manufacture and the whole value chain capacity if long term pipelines can be assured within a manageable scaling up timetable. The manifesto commitment of a government investment of £3.8bn into social housing over 10 years gives exactly the confidence that the market needs. The plan introduced by Matt Harrison at the Inside Housing Retrofit Challenge conference in March 2021, of 3 waves of investment of 3 years each, potentially provide this managed scaling up with each wave. However, a caveat is that the supply chain response and their offer to the market should be tempered by the need to deliver long term, high quality outcomes based on science not short term market drivers and economic opportunities.

6. At the same time, cost reduction is dependent on moving from pilots and small demonstrators to area based programmes with solutions that overcome segmentation of the market which will seek to deliver the easiest first. IT solutions, digital inclusion and other mechanisms need to provide effective, affordable solutions to working across tenures and with many different kinds of householders. However, there is challenge, particularly in mixed tenure and predominantly private housing areas of creating the circumstances whereby everyone will engage at the same time.

7. Costs, skills, expertise, pressure of work, timescales, uncertainties about no regrets pathways are significant. Most stockholders do not have resourced time, expertise to adequately tackle their decarbonisation planning and delivery at this time.

8. Costs are the most significant element along with capacity at all parts of the value chain from leaders to designers, manufacturers, installers and maintenance teams. The lack of pipeline is not resulting in cost reductions or the confidence of future cost reductions required for scaling up retrofit.

9. Whilst an archetype approach is useful at portfolio level to provide an overview of the task, routes to delivery and indicative costs, it is recognised and essential that detailed whole home (dwelling and household) surveys are carried out. Net zero targets require significant attention to detailing addressing air tightness etc and delivery of high quality works without a performance gap. This all costs money – time, high quality materials and products, monitoring and budgets for remedial works, with adequate maintenance capacity – if a net zero design is to perform over time.

10. Insulation to EPC C will need to be added to, probably involving removal and reinstallation of additional thicknesses, to reach net zero. A very clear cost benefit of the no regrets pathway is required.

11. Need costings of the additional quality outcomes as intended through PAS 2035 and Trustmark. This must be fed into financial models and business cases that also include not just fabric and technology costs but also avoided costs (voids, rent defaults, disrepair claims, mould removal and redecoration costs etc) AND income streams. Currently there are opportunities through aggregation, peak load shifting and energy sales.

12. The economic stimulus initiatives launched in 2020, with short timescales and impacted by lack of production due to covid, furlough and issues at UK ports have created an overheated market with costs rising, materials in short supply and a weariness with the pressure of quick turnaround in a context of uncertainty of ability to deliver. The overwhelming recommendation is that decarbonisation of the stock should be recognised as a massive infrastructure project with huge opportunities at stake in terms of job creation, greening the economy, improving lives and delivering against our carbon reduction targets. To do this, there needs to be a long term commitment, starting small and slow but growing incrementally and therefore scaling up fast by years 3 – 4,



allowing capacity to be developed, mistakes to be identified and remediated before largescale rollout and trust and confidence and engagement / support of the supply chain and general public to be built.

13. The current focus on compliance investments is impacting on resources to plan for decarbonisation and on budgets to deliver decarbonisation.

14. Concern about no regrets decision making is high. There is awareness of mistakes in specification in the past and emerging learning about the actual performance life of components such as inverters but uncertainty about how newer models will perform.

15. Retrofit is a new industry; air tightness, addressing cold bridging issues, quality assurance, market pressures plus pricing in of risk are all causing costs to rise impacting on financial models and business planning.

16. Equity concerns are common – if annual budgets are used to fund a few deep retrofits, then by comparison then the vast majority of other residents will continue to live in substandard properties for years to come.

Therefore, scaling up deep retrofit depends on development of funding instruments that can service the able to pay market as well as those far less able to pay. In this way, margins can be created to enable subsidy for the less able to pay.

17. Social rents cannot be raised to reflect improved comfort and MAYBE reduced bills so creating a lack of equity across the resident offer / A total cost of occupation model should be developed to allow a balance between investment in energy efficiency and rent + energy costs for tenants. Further legal advice is required in the meantime on non-qualifying service charges.

18. If properties are sold to cross subsidise deep retrofit or development budgets are reallocated to retrofit, the total number of social homes falls. Many landlords are not happy about this.

19. There are opportunities to create a revenue stack for social landlords through energy storage and trading of the surplus before this is taken by private solely profit driven market operators.

## RECOMMENDATIONS DRAWN FROM THE RESEARCH INTERVIEWS AND ANALYSIS

### PRINCIPLES

1. Recognise and act on the principle that dwellings are homes and if a national retrofit programme is to be delivered it must be people focussed not just an asset management activity.
2. Give pipeline confidence – essential for the supply chain to scale up (including training provision, consultancy services, manufacturers and installers)
3. Develop leadership capacity
4. Use procurement to drive long term high quality outcomes “noting that attempts to simplify and quicken the process have failed to date”
5. Link area based retrofit programmes to energy and heat infrastructure investment plans - develop area based phasing programmes for retrofit to C and net zero across LA areas to allow collaborative investment decisions, clear phasing and establishment of long term advice and support to residents, allowing a forward sight of innovation required.

### ESTABLISH THE CORE COMPONENTS OF SCALING UP RETROFIT

Note the recommendations of scaling up retrofit programmes including development of the 10 components listed Scaling up Better Homes Yorkshire report<sup>3</sup>:

- a. customer journey:
- b. assessment and calculation:
- c. monitoring and data:
- d. IT and software:
- e. specification and detailing:
- f. contacting and guarantees:

<sup>3</sup> <https://shap.uk.com/shap-projects-page/scaling-up-better-homes-yorkshire/>



- g. additional revenues:
- h. finance vehicle:
- i. scalability:
- j. workforce development & skills

## QUESTIONS RAISED DURING THE RESEARCH

1. Will EPC B + decarbonised energy be sufficient to meet a 2050 net zero target? Or should we stop using EPCs as we head towards net zero? Should we talk instead about space heating demand noting that it is possible to get to an EPC of B with lots of renewables and little demand reduction?
2. Why is there a focus on archetypes when, fundamentally, every dwelling is different having been customised over time?
3. What is the evidence required to demonstrate a kWh/m<sup>2</sup>/pa performance?
4. How can a 'no regrets' pathway decision be made when there is still lack of certainty/confidence/clarity in the future energy system noting that given the stresses on the renewable energy supply? The assumption ought to be that we try and get domestic energy demand as near to zero as possible given the likely emissions overshoot from other sectors of the economy.
5. Has the impact of electrification of heating on fuel poverty been truly analysed (regardless of issues of operational use, insulation etc) even with demand reduction taken into account?
6. What analysis has been done on the costs and equity issues of deep retrofit to some properties every year leaving the rest behind v some investment in most properties over the short term whilst developing the strategy to get all stock to net zero by 2050?
7. How will the issue of equity of rents v thermal performance be addressed? Will there be any change in the approach to rent caps to allow for social warm and cold rents and total cost of occupation approach so that there is potential to capture return on investment whilst also recognising and addressing the issue that some tenants benefit from investment in their homes but pay the same as those without that investment?
8. How do the different local climate emergency targets relate to landlords decarbonisation planning – with some local authorities looking to reach net zero by 2030, 2038, 2041 for example whilst regulatory targets being considered as primary drivers are 2030 to reach EPC C and 2050 to reach net zero?
9. How do the national and local net zero targets relate to the 30 year asset management programmes operated by most landlords?
10. When will the green finance required to support stock decarbonisation at the rates required become available along with associated warranties, insurances etc?
11. What are the recommended tools/methodologies to support stock decarbonisation strategies and programmes?
12. Can process and product improvements bring costs down enough whilst more investment is required in survey, design and quality assurance plus the increased spend on air tightness, enhanced materials and products?
13. The effect of short term project funding is currently exacerbating market shortages due to Brexit, Covid and fire risk responses. What flexibility will there be on BEIS funded projects taking these factors into account?
14. What thinking has there been about the timescales for planning, financing and delivering retrofit programmes as opposed to ongoing business needs e.g. voids and disrepair claims?



15. What thinking has there been about financing leaseholders and right to buy owner occupiers to carry out retrofit to the net zero standard being planned by landlords? For example, EWI to 250mm designed for net zero requires roof extensions, significant works to bay windows etc. etc. The LAD and GHG grants of £10,000 will not allow matching works between social landlords delivering to net zero and adjacent private landlord owned properties?
16. What work is going on to tease out planning issues and approaches to resolution? Walsall MBC has just mandated a limit of 105mm for EWI on frontages?



Department for  
Business, Energy  
& Industrial Strategy



West Midlands  
Combined Authority



### 13. Annexes

Please annex any other relevant information you wish to provide, for example: results of the project including images, diagrams, and any outputs (such as final stock improvement surveys).

This section includes summaries of a number of different activities to understand the data available and modelling outcomes for taking stock at scale to EPC C and to net zero.

The main findings are:

There are many data sets around and one challenge, particularly for large stockholders, is to clean and merge data. Following company mergers, one stockholder has 48 different data sets.

The coverage of data is often patchy and the quality of data is often poor.

Asset management data is not aligned with decarbonisation planning requirements.

EPCs are driving decarbonisation planning but are inherently not the right tool.

Previous energy efficiency programmes have not required updating of EPCs in many cases so EPCs are out of date.

EPCs don't necessarily reflect the energy efficiency characteristics of a property. Flats can be EPC C and very hard to heat with damp and condensation issues, for example.

Data analysis tools such as SAVA, Parity Projects Pathways and Portfolio and DREeam can bring cost effectively bring together data, clone data and give degrees of confidence on the data.

These tools can provide high level reports on portfolio upgrade costs and potential works/pathways.

Further analysis is then required to align modelled decarbonisation pathways with corporate priorities, strategic programmes, business plans and investment budgets.

The project looked at:

1. Costs for full stock assessments
  2. Parity Projects Pathways report for Rugeley and indicative costings for upgrading stock to EPC C and net zero
  3. Common archetypes being modelled for inclusion in SHDF Demonstrator and costings for upgrading to a space heating demand reduction to 50 kWh/m<sup>2</sup>/pa.
  4. Measures that would align with EPC C and zero carbon pathways within the LAD and GHG grants available.
  5. Online sites such as Google Maps and Street Check for overviews of images and housing tenures in an area.
  6. Modelling of nominated archetypes by stockholders engaging in the research.
- 
1. Costs for full stock assessments

A report that has been shared with this project details that any value of capital works proposed would need to include approximately 7% of staff time.

A report that had been completed over 4 months on stock data analysis has cost in the region of £50,000 in total with staff expenses included.



Supply chain consultants quoted £15,000 - £20,000 for a stock assessment report depending on the size of the stock and including a tool such as Parity, SAVA or DREeam. The cost for these varies depending on the size of the stock portfolio and on how long a licence is required. Indicative costs are 70p – 90p per property. Where EPCs are required, at an indicative cost of £50, the total bill could be £250,000 for 5,000 homes. At these costs the tools available become cost effective, albeit with strong caveats they provide on the robustness of the data.

There is scope to combine costs of EPCs, stock condition surveys and detailed design surveys if they can be carried out by one surveyor trained in all aspects, saving up to 90% of the cost of 3 separate surveys.

2. Parity Projects Pathways report for the project Zero Carbon Rugeley and indicative costings for upgrading stock to EPC C and net zero

There are 10,570 properties in the Zero Carbon Rugeley area. The full exec summary is attached. The headlines are that the stock is mainly post 1950, mainly on gas and mainly detached or semi-detached.

6000 properties are EPC D, 2000 EPC E and 2,400 EPC C.

	Total	Socially Rented	Private Rented	Owner Occupied
G	22	0	1	6
F	193	20	22	50
E	1,905	102	134	592
D	6,044	677	349	1,843
C	2,362	279	204	629
B	40	10	4	2
A	0	0	0	0
	<b>1,088</b>	<b>714</b>	<b>3,122</b>	
	(10%)	(7%)	(30%)	

The cost to retrofit to EPC C is £3,250 on average and to net zero with solar is £37,270. The total investment costs are £26.5 million to EPC C and £400 million to net zero with solar.

**Table 1: The cost and benefit of the SAP C and Net Zero Pathways**

Pathway Name	1: SAP C	2: Net Zero CO <sub>2</sub> with Solar
<b>Total Cost</b>	£26.5 Million	£398.3 Million
<b>Average Cost Per Home</b>	£3,250	£37,270
<b>Affected</b>		
<b>Mean Tonnes of CO<sub>2</sub></b>	3.14	0.40
<b>Following Investment</b>		

The report also provides measures recommendations.



The next step for the Zero Carbon Rugeley team at SHAP is to carry out a detailed physical survey of 4 properties and produce detailed designs based on survey. Working with other team members, there will be investigation of how the retrofit could be scaled up in association with investment in the energy infrastructure at substation level.

### 3. Common archetypes being modelled for inclusion in SHDF Demonstrator and costings for upgrading to a space heating demand reduction to 50 kWh/m<sup>2</sup>/pa.

Further examples of common archetypes and their current cost estimates to move to C and to space heating demand of 50kWh/m<sup>2</sup>/pa is shown in the table below. This information has been provided from SHDF Demonstrator bids.

	1	2	3	4	5	6
Archetypes - all currently D or below	post-1945 small flats; narrow cavity/system built; has loft insulation; floor insulated or hard to insulate	post-1945 small flats; narrow cavity/system built; needs loft insulation; needs under-floor insulation; needs glazing and door; suitable for PV	semi-detached house; pre-1919 or narrow cavity; needs loft insulation; needs underfloor insulation; needs doors/glazing; suitable for PV	post-1945 flat; has CWI; needs loft insulation; needs underfloor insulation; needs glazing/doors; suitable for PV; suitable for GSHP	post-1945 semi-detached house; has CWI and loft insulation; needs underfloor insulation; has open chimney; suitable for PV	post-1945 semi-detached house; has loft insulation; uninsulated conventional cavities; needs underfloor insulation; has open chimney; suitable for PV
Example cost to reach EPC C, labour and materials only, without grant funding	£12,456	£15,500	£17,280	£4,043	Not yet available	Not yet available
Example cost for Whole-house retrofit to under 50 kWh/m <sup>2</sup> per annum heat demand, labour and materials only, without grant funding	£30,525	£37,950	£42,075	£29,975	£21,650	£23,540

### 4. Measures that would align with EPC C and zero carbon pathways within the LAD and GHG grants available.

The identification of suitable properties at EPC E, F and G is challenging.

The identification of measures that can be afforded within the LAD and GHG budgets available that can be installed to improve energy efficiency without compromising the value for money from that investment on a whole house decarbonisation pathway is proving challenging.

Results are emerging from some interviewees on this project but are not available currently.

### 5. Online sites such as Google Maps and Street Check for overviews of images and housing tenures in an area.



Where data were not available or stockholders were concerned about commercial sensitivities, a simple approach to putting together information about some archetypes was developed by taking google map images, looking up their EPCs, cross referencing them to modelled archetypes, examining the potential for area based projects by looking at Street Check, creating an archetype handbook with a illustrative photo, a snapshot of tenure and household sizes in the address location. This would include commentary on potential issues for retrofit projects, for example how adjoining properties in private ownership should sensibly be addressed given any planning requirements and what the approach to detailing at party walls should e.g. where the depth of insulation would mean eaves extension would be required. Other data sets can then be overlain. This may not be a useful approach but does provide some quick insights to teams who are not familiar with their assets.



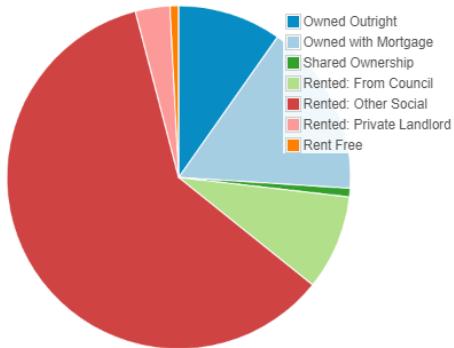
E.G.

Bungalow, 1966, EPC = D and E

Figures below from Street Check website. SHAP research confirms 162 households are in fuel poverty in this ward location, between 11.9% and 12.2% of households.

#### Housing Tenure

Owned Outright	12
Owned with Mortgage	20
Shared Ownership	1
Rented: From Council	11
Rented: Other Social <i>inc. charities and housing associations</i>	74
Rented: Private Landlord <i>inc. letting agents</i>	4
Rent Free	1
<b>Total</b>	<b>123</b>



#### Housing Occupancy

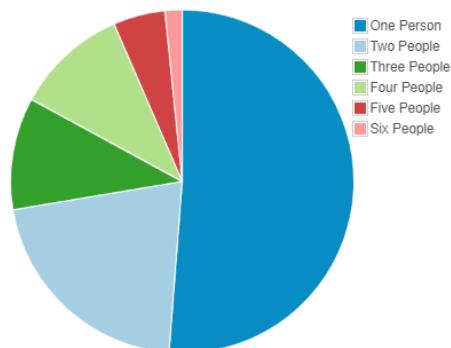
[↑ Back to Top](#) [Embed This](#)

#### Housing Occupancy

This data lists the total number of residents normally resident within each household. The figures do not record under- or over-occupancy.

#### Housing Occupancy

One Person	63
Two People	26
Three People	13
Four People	13
Five People	6
Six People	2
Seven People	0
8+ People	0
<b>Total</b>	<b>123</b>



## 6. Modelling of nominated archetypes by stockholders engaging in the research.

As part of this work we have investigated different potential costs that will be needed for energy improvements on stock.

As a result of this we have identified in the Marches that would be suitable for investment as follows:

- **11,964** number of EPC Band D-G properties needing investment of **£63.5m** to get to EPC C.
- **33,363** properties needing investment of **£501m** to get to NZC.

These figures are not precise and need refining but are indicative of the scale of investment needed.

Current percentages and number of properties per EPC Band across **the Marches LEP**:

	% Housing Stock Per EPC Rating							
	A	B	C	D	E	F	G	Unknown
Percentage Total for All RPs (listed above)	3.5%	9.6%	30.1%	33.9%	5.8%	0.23%	0.02%	17.6%
Number of Properties	21,399			9,777	1,290	95	37	765

### Delivery Costs

- Asset Management – Costs of employment for Asset Management Team
- Surveying costs – currently we have an approximation of £75 per property
- EPC Costs – approximately £50 per property
- Upskilling costs.

### Costs to EPC C

We have undertaken some modelling using RdSAP for different archetypes to get to EPC 'C'. The estimated costings of which can be found below;

- **G to C: £34,000 per property** (Based on a 2 Bed Semi-detached bungalow, measures including EWI, Low Energy Lighting, Roof insulation Top Up/Insulation Top Up, Triple Glazing, Door Upgrades, ASHP, cylinder and heating control upgrades)
- **F to C: £32,000 per property** (Based on a 3 Bed Semi-detached house, measures including EWI, Low Energy Lighting, Roof insulation Top Up/Insulation Top Up, Triple Glazing, ASHP, Cylinder Upgrades)
- **E to C: £7,000 per property** (Based on a ground floor flat, measures including High Heat Retention Storage Heaters, Low Energy Lighting, Roof Insulation Top Up/Insulation Top Up, Double Glazing)
- **D to C: £4,500 per property** (Based on a first floor flat, measures including High Heat Retention Storage Heaters, Low Energy Lighting, Roof Insulation Top Up/Insulation Top Up)

### Costs to NZC

We have undertaken some modelling using RdSAP for different archetypes to get to 'NZC'. The estimated costings of which can be found below;



- G to 'NZC': £45,000 per property** (Based on a 2 Bed Semi-detached bungalow, measures as per the above AND Photovoltaic Panels – based on a large array size, Solid Floor Insulation)
- F to 'NZC': £41,000 per property** (Based on a 3 Bed Semi-detached house, measures as per the above AND Solar Thermal Panels, Photovoltaic Panels and heating control upgrades)
- E to 'NZC': £31,000 per property** (Based on a ground floor flat, measures as per the above AND Heating changed to a Heat Pump, Cylinder Upgrades, EWI, Triple Glazing & Photovoltaic Panels)
- D to 'NZC': £27,500 per property** (Based on a first floor flat, measures as per the above AND Heating changed to a Heat Pump, Cylinder Upgrades, Triple Glazing & Photovoltaic Panels).

#### Additional Costs for Healthy Homes:

- Ventilation costs –
  - Approximately £1,000 for room only kitchen & bathroom
  - £2,000 - £4,000 Whole House ventilation system
- Air tightness test - £130-£250 per property
- Draught Proofing - £50 per property

Costs need to include for ventilation measures, air tightness testing and measures for draught proofing although these cannot be selected as part of the modelling in RdSAP. These are important not to miss out in the costing exercise because they form part of the solution to a healthy home for tenants.

Understanding impacts of draughts in retrofit properties and necessary levels of air change –  
 Healthy homes are an important factor post installation. Whilst airtightness is critical to ensuring a building is thermally efficient, adequate ventilation strategies and indoor air quality remain equally important. Ventilation should be controlled rather than occur due to air leakage and draughts. With existing dwellings adequate ventilation should be provided to ensure that excess moisture does not cause problems such as damp or exacerbate or create health issues.

The Archetype modelling has been completed by an energy assessor with over 8 years of building modelling experience. It has been completed in the RdSAP Software and therefore there are limitations. Assumptions have been made (listed below). The modelling only takes into account 'regulated' energy consumption, householder consumption and usage patterns have not been taken into account.

Works such as retrofit and energy efficiency improvement measures can often spur behaviour change within residents, for any future projects, data loggers could be included for pre and post installation to monitor not only the improvement on energy efficiency from the measures but also how this alters householder consumption.

#### Assumptions:

- Figures have been based on 6 common archetypes, which will not represent all property types and build formations, therefore the costings can only be taken as estimations.
- The 6 common archetypes are:
  1. Traditional Masonry Ground Floor Flat – with electric storage heaters
  2. Traditional Masonry First Floor Flat – with electric storage heaters
  3. Traditional Masonry 2-bed Semi-detached Bungalow – with Bulk LPG Heating
  4. Solid Wall 3-bed Semi-detached House – with solid fuel heating
  5. Timber Framed 3-bed Semi-detached House – with electric boiler.
  6. Traditional Masonry 2-bed Mid-terrace House – with gas boiler
- The properties have been modelled using the RdSAP modelling software used for existing dwellings and therefore modelling Net Zero Carbon is not achievable. A proxy of an EPC Rating of 'A' has been used.



- Examples of minimum estimated costings for measures used to achieve EPC rating 'C' and EPC rating 'A' can be found in the table below these will alter on a property-by-property basis.

<b>Measure</b>	<b>Cost</b>
Cavity Wall Insulation	£330 to £475
External Wall Insulation	£9,000 to £15,000 (1 bed flat to 3 bed semi)
Internal Wall Insulation	£7,400 (dependent on amount and type of insulation)
Roof Insulation Top-up	£285-£500 (dependent on amount of insulation)
Floor Insulation	£2,200 (Based upon surface laying)
Low Energy Lighting	£8 per LED
Glazing Upgrades (double glazed/triple glazed)	£1,600 to £5,800 (dependent on window type)
Door Upgrades	£900 per door
High Heat Retention Storage Heaters	£850 per unit
ASHP	£9,000 to £12,000 (excluding cylinder upgrade)
GSHP	£16,000 (excluding cylinder upgrade)
Upgraded Heating Controls	£180
Cylinder Upgrades	£1,400
Waste Water Heat Recovery Systems	£1,000
PV	£1,500 (per kWp)
Solar Thermal	£4,500 (evacuated tube)
Ventilation Measures	£1,000 to £4,000 (dependent on system)
Air Tightness Testing	£130 (per property)
Draught Proofing	£50 (per property)

All of the archetypes have been modelled in RdSAP Software to try and ascertain an indicative cost to both EPC C and Net Zero Carbon. These are based on the measures that have been provided to the dwellings to achieve these requirements and therefore are only an estimated figure. As their baseline the archetypes have a range of different insulation measures and heating fuels to try and map the costs from moving from these to an electricity based heating system (as part of the Government's policies to move away from fossil fuels).

The archetype modelling is not in depth and has only been completed to give approximate costings. Issues with using RdSAP Software have been highlighted due to its restrictive nature and inability to model Net Zero Carbon, however it was the best tool accessible in the timescales and funding available.

It should be noted that EPC 'A' has been used as a proxy for NZC, as NZC was unable to be modelled in the RdSAP Software.

In addition to the modelling for the project, information was available from BEIS SHDF Demonstrator projects and Parity Projects Pathways report for Rugeley.



## ARCHETYPE BREAKDOWN

Although it is agreed that at delivery each building should be treated as an individual unit with detailed design solutions dependent on what surveys identify, at a strategic planning level, archetype analysis can be helpful.

Six archetypes were modelled as shown below.

A further set of results were obtained from SHDF Demonstrator bid submissions and other sources. Photos are courtesy of Google Maps

### **Archetype 1:**

#### **Ground Floor Flat based on:**



Traditional masonry, unfilled cavity wall, solid ground floor, single glazed windows, and electric storage heating with a cylinder. Having only low energy lighting to 50% of the dwelling. This gives an EPC of E (53).

#### Uplifts to EPC C:

- Double glazing with a low emissivity coating
- 100% low energy lighting
- Filling the cavity wall
- Providing high heat retention storage heaters (based on the Dimplex Quantum Storage Heaters)

#### Uplift to Net Zero Carbon (Using a Proxy of an A Rating):

- Double glazing with a low emissivity coating
- 100% low energy lighting
- Filling the cavity wall
- Insulated Door
- Provision of an ASHP
- Upgraded Cylinder with 160mm insulation and cylinderstat
- External Wall insulation
- 2kWp of PV

**Archetype 2:**

**First Floor Flat based on:**



Traditional Masonry with a filled cavity, pitched roof with 100mm of insulation, double glazed windows, electric storage heating and cylinder. Having only low energy lighting to 50% of the dwelling. This gives an EPC of D (58).

**Uplifts to EPC C:**

- Roof Insulation Top up to 300mm
- 100% low energy lighting
- Providing high heat retention storage heaters (based on the Dimplex Quantum Storage Heaters)

**Uplift to Net Zero Carbon (Using a Proxy of an A Rating):**

- Roof Insulation Top up to 300mm
- 100% low energy lighting
- Triple Glazed Windows
- Heat Pump
- Upgraded Cylinder with 160mm insulation and cylinderstat
- Waste Water Heat Recovery System
- 2kWp PV

**Archetype 3:**

**2 Bed Semi-detached Bungalow based on:**



Traditional Masonry with a filled cavity, pitched uninsulated roof, solid ground floor, double glazed windows, Pre-1998 LPG Bulk Boiler with cylinder. Having only low energy lighting to 30% of the dwelling.

This gives an EPC of G (13).

Uplifts to EPC C:

- Roof Insulation Top up to 400+mm
- 100% low energy lighting
- 100mm External Wall Insulation
- Triple Glazing
- Upgraded doors
- ASHP with time and temperature zone control
- Upgraded Cylinder with 160mm insulation and cylinderstat

Uplift to Net Zero Carbon (Using a Proxy of an A Rating):

- Roof Insulation Top up to 400+mm
- 100% low energy lighting
- 100mm External Wall Insulation
- Triple Glazing
- Upgraded doors
- ASHP with time and temperature zone control
- Upgraded Cylinder with 160mm insulation and cylinderstat
- 4 kWp of PV
- 100mm Ground floor insulation

**Archetype 4:**

**3 Bed Semi-Detached House based on:**



Masonry build solid brick wall, pitched roof with 50mm insulation, solid ground floor, double glazed windows, solid fuel dual fuel stove with back boiler and cylinder. Having low energy lighting to 100% of the dwelling already. This gives an EPC of F (38).

Uplifts to EPC C:

- Roof Insulation Top up to 400+mm
- External Wall Insulation
- Triple Glazing



- Upgraded Doors
- 100mm Ground floor insulation
- ASHP
- Upgraded Cylinder with 160mm insulation and cylinderstat

Uplift to Net Zero Carbon (Using a Proxy of an A Rating):

- Roof Insulation Top up to 400+mm
- External Wall Insulation
- Triple Glazing
- Upgraded Doors
- 100mm Ground floor insulation
- ASHP
- Upgraded Cylinder with 160mm insulation and cylinderstat
- Solar Thermal Panels
- 3.5kWP PV Panels
- Upgraded heating controls

**Archetype 5:**

**3 Bed Semi-Detached House based on:**



Timber framed external walls, with an uninsulated pitched roof, double glazed, solid ground floor, electric boiler with a cylinder. Having only low energy lighting to 50% of the dwelling. This gives an EPC of E (53).

Uplifts to EPC C:

- 270mm Roof Insulation
- Internal Wall Insulation (50mm)
- 100% low energy lighting
- Triple Glazing
- 100mm Ground floor insulation
- ASHP
- Upgraded Cylinder with 160mm insulation and cylinderstat

Uplift to Net Zero Carbon (Using a Proxy of an A Rating):

- 270mm Roof Insulation
- Internal Wall Insulation (70mm)
- 100% low energy lighting



Department for  
Business, Energy  
& Industrial Strategy



West Midlands  
Combined Authority



- Triple Glazing
- 100mm Ground floor insulation
- ASHP
- Upgraded Cylinder with 160mm insulation and cylinderstat
- 3.5kWP PV Panels
- Upgraded heating controls
- Solar Thermal Panels

#### Archetype 6:

#### 2 Bed Mid-terraced House based on:



Traditional Masonry with a filled cavity, pitched roof with 200mm, solid ground floor, double glazed windows, gas boiler with programmer and room thermostat and secondary gas room heaters. Having only low energy lighting to 30% of the dwelling.

This gives an EPC of D (65).

#### Uplifts to EPC C:

- 100% low energy lighting
- New efficient gas boiler – the SAP contribution from installing a new energy efficient gas boiler is significant, even though this doesn't fit with the move away from fossil fuels – it is worth exploring for those that are currently on mains gas and are using a gas boiler. Where householders have a gas boiler installed already, they are wary of having alternative heating methods installed and Stock Holders have raised concerns about moving from gas to electricity pushing bills higher.

#### Uplift to Net Zero Carbon (Using a Proxy of an A Rating):

- 100% low energy lighting
- New efficient gas boiler
- Roof Insulation top up to 400+mm
- Upgraded heating controls
- Upgraded double glazing
- 3.5 kWp of PV

Use of archetypes do not take into account difficult to treat properties, and therefore will not be able to have a common pathway for retrofitting measures. A 'no-regrets' pathway means that each individual property needs to have its own pathway for energy efficient improvement.

It has been noted that the range of housing across all projects would mean that there would not be one way to approach retrofit on this scale. An ‘off-the shelf’ range of measures would not be an appropriate pathway and would result in unsuitable and ineffective measures being used in the wrong circumstances.

## NON TRADITIONAL ARCHETYPES

There are significant numbers of non-traditional archetypes in the West Midlands. Some cannot be retrofitted to net zero and these estates will be redeveloped. As no information on these proposals have been discussed with residents, no detailed information is given in this report.

Examples of the range of non-traditional archetypes that are found include:

**Arcon** - Steel Frame Prefabricated House

**BISF** – (British and Iron Steel Federation) 1946 steel framed houses, with differing cladding to ground and first floor.

**Boswell Houses** – concrete prefabricated houses

**Bryant Wallframe Houses** – hard to heat, very little insulation.

**Cornish** – prefabricated houses and bungalows with a distinctive mansard hipped roof.

**Dennis-Wild** – steel framed houses.

**Mack-trad**

**MHC**

**Wimpey no-fines** house type – cast in-situ houses, bungalows, maisonettes and low rise flats.

**Orlit** – made from precast Orlit concrete.

**PY Solid**

**Repcast conc**

**Smith system houses** – built from large concrete blocks

**Spooner house type** - timber framed house built with traditional brick exterior to ground floor and profiled steel cladding to the first floor.

**T Block Tarran** – prefabricated wooden framed bungalows clad in pre-cast concrete

A common feature of these property types are that they have been designed to look as close as possible to a conventional dwelling as possible and it takes more than a superficial survey to identify them sometimes. Many of them are poorly insulated and often reflect a period of time where rapid re-building was needed after the war. This has led to unconventional build styles and problems with damp, cold and maintenance issues.

### Almshouses

Almshouses are a perfect example of properties which can be hard to treat and often energy inefficient so shouldn't be overlooked. Looking at the available information for the Almshouses, they range from 1600's Wattle & Daub, timber framed dwellings to mid-Victorian, mock-Elizabethan sandstone properties, most of which a Grade I or II listed. There is very little EPC data on the properties, however ones that do have EPCs show they are low D or E ratings. A set of Grade II\* listed Almshouses, consisting of limestone, tiled roofs and casement windows have E-G Ratings. The listing status of the properties does affect the retrofit and energy improvement options for these dwellings, making them very hard to treat.

### Issues & barriers to using archetypes as the basis of decision-making

Whilst identifying common archetypes across an area is a useful exercise, in which common problems can also be identified, each home is different with differing needs for the householders, making it difficult to use a set common of archetypes to create a set pathway for retrofit.



Current EPC data is subjective, and the data might not exactly represent what is there. There are often assumptions made where access is difficult. Higher level investigations could be necessary such as:

- Thermal imaging surveys / Thermographic inspections
- Air tightness testing
- Borescope/inspection cameras
- Air quality monitoring
- Dewpoint analysis

All the above need to be kept in mind during a retrofit process to ensure a healthy and habitable home, whilst they might not all necessarily be needed, additional investigations do need to be considered.



## APPENDICES

### APPENDIX 1 – SUPPLY CHAIN

### APPENDIX 2 – INTRODUCTION TO WHOLE HOUSE RETROFIT WEBINAR 25.2.21

### APPENDIX 3 – APPENDIX 3 – EPC DATA SUMMARY FROM 10 LANDLORDS BY STOCKHOLDER SIZE

### APPENDIX 4 – APPENDIX 4 – PROJECT STATS

### APPENDIX 5 – RESEARCH TEAM AND INTERVIEWEES BY SECTOR - SEMI STRUCTURED AND INFORMAL INTERVIEW FORMATS

### APPENDIX 6 - TOOLS AND RESEARCH REPORTS REFERENCED IN INTERVIEWS

### APPENDIX 7 – ADVICE ON AIR TIGHTNESS TESTING PROVIDERS FORWARDED TO ONE INTERVIEWEE

#### APPENDIX 1 – SUPPLY CHAIN

##### 1. SUPPLY CHAIN COMPANY INTERVIEW FINDINGS

- Retrofit has not been a particularly strongly recognised activity within the construction sector, particularly whole house retrofit approaches.
- Contractors are beginning to develop and market their retrofit (as opposed to asset management repairs and replacement) offers.
- Areas of activity such as offsite manufacture which is widely adopted in commercial uses such as students halls, hotels etc have not, to date, translated at scale into domestic housing. In particular, there are issues for retrofitting existing stock, generally handbuilt on site, with offsite manufactured panels or other solutions where production lines need exact tolerances which are not found on site.
- There are currently capacity issues within supply chains which is due to multiple factors – interest in other funding streams have led to overcapacity, COVID-19 has slowed down production/ created a back log of installations/ caused delays in surveying etc, issues have been highlighted about the availability of local installers due to demand.
- Lack of confidence in forward pipelines has reduced the potential engagement by the supply chain in Trustmark and PAS 2035 accreditation and GHG vouchers opportunities although there is an increasing percentage of the supply chain now acquiring the support of Retrofit Coordinators and Assessors both in-house and third party to give guidance on retrofit works.
- The Retrofit Academy is working with others to ensure accredited PAS 2035 individuals are supported to effectively put theory into practice.<sup>4</sup>
- The short and stop/start programmes has made it difficult to run a successful apprentice programme. New formats such as ‘job share’ or ‘carousel’ apprenticeships are potential ways forward. KPIs set out in procurement could usefully be reworded from ‘how many apprenticeships will be created’ to “how many apprenticeships are already in place that will benefit from this contract”.

**Everyone consulted has confirmed that a long term pipeline will stimulate an adequate market response.**

<sup>4</sup> [https://www.retrofitacademy.org/wp-content/uploads/2020/05/TRA\\_Process\\_Map.pdf](https://www.retrofitacademy.org/wp-content/uploads/2020/05/TRA_Process_Map.pdf)

## APPENDIX 2 - INTRODUCTION TO WHOLE HOUSE RETROFIT WEBINAR 25.2.21

As part of the project, SHAP held a webinar to scope the interest of SHPs in such an event and to poll them on their current decarbonisation experience and plans.



### Workshop: Introduction to whole-house retrofit

- **QUICK POLL!** How much whole-house retrofit have you done? -

Do this QUICK POLL and we will send you the link to our recent Whole-House Retrofit Webinar video!

- **6-months Membership** -

Shorter membership period – still benefit from SHAP support

The split of bookings and attendance reflected the historic SHAP membership base in the West Midlands and the current wider engagement and interest in retrofit. The target audience was SHPs but other ticket types were made available due to wider sector interest. About 25% of those booking were new audiences to a SHAP event and SHAP members invited new colleagues to attend.

The webinar format was a conversation between the Energy Manager at Sanctuary who have been working on their decarbonisation pathway for many years, followed by a Q&A session.

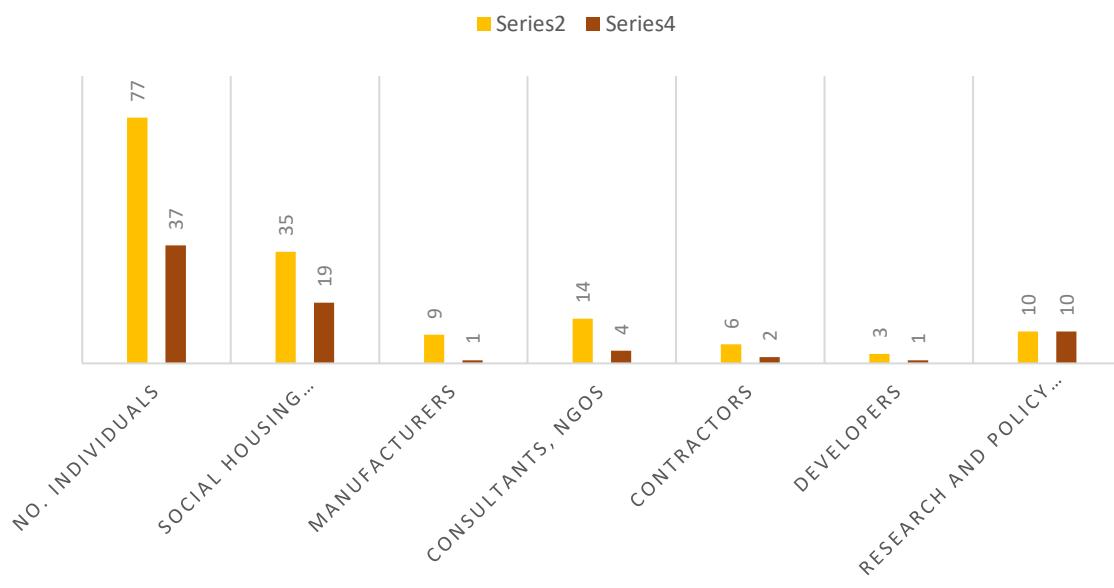
A follow up poll was responded to by 12 SHPs of the 19 attending which asked 4 questions. Respondents could tick as many categories in each question as they felt applied for Questions 2, 3 and 4.

The webinar was billed as an introduction and was advertised to SHAP members and via networks and channels open to public view.

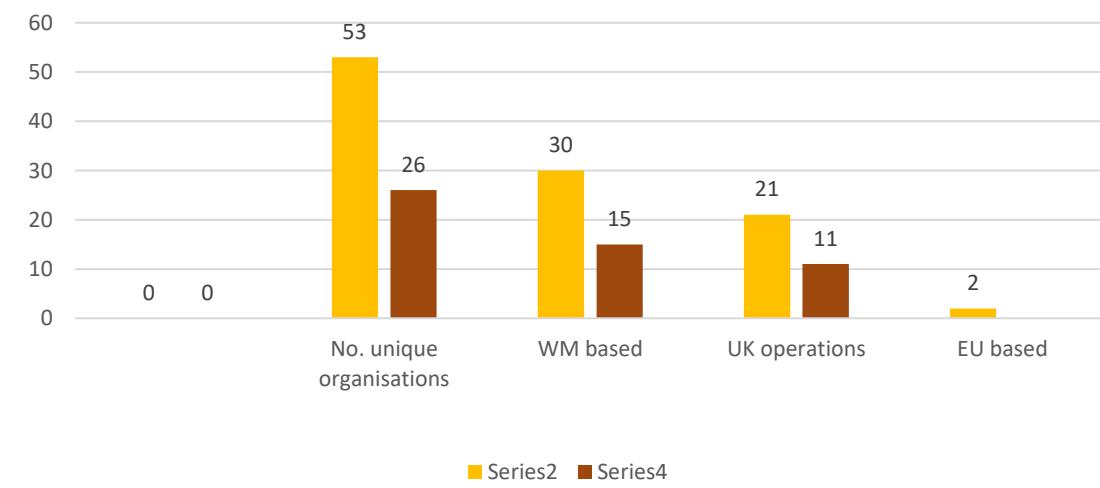
This event was one of many in the same period but attracted a registration response of 77 from 53 separate organisations and an attendance of 37 from 26 organisations including 19 from SHPs. The drop out rate was higher than we would normally expect but reflected the amount of activity to bring forward retrofit projects and deal with financial end of year pressures.



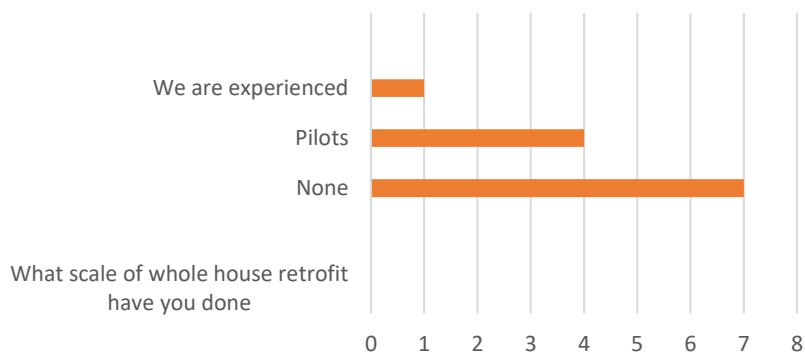
## WHOLE HOUSE RETROFIT INTRODUCTORY WEBINAR INDIVIDUALS BOOKING AND ATTENDING BY ORGANISATION TYPE FEB 2021



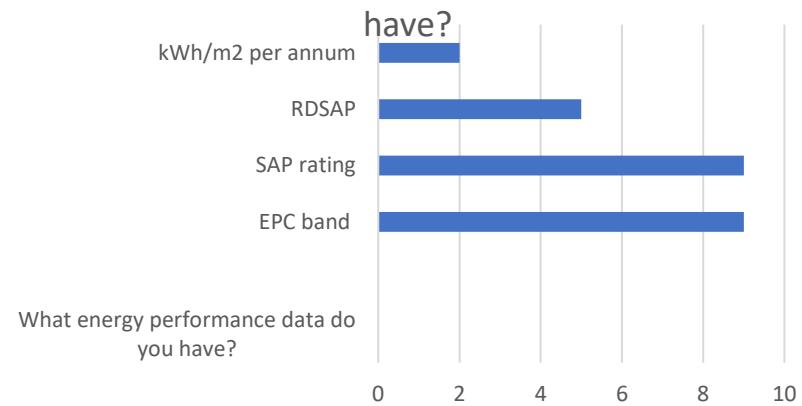
## WHOLE HOUSE RETROFIT INTRODUCTORY WEBINAR FEB 2021 ORGANISATIONS BOOKING AND ATTENDING BY LOCATION



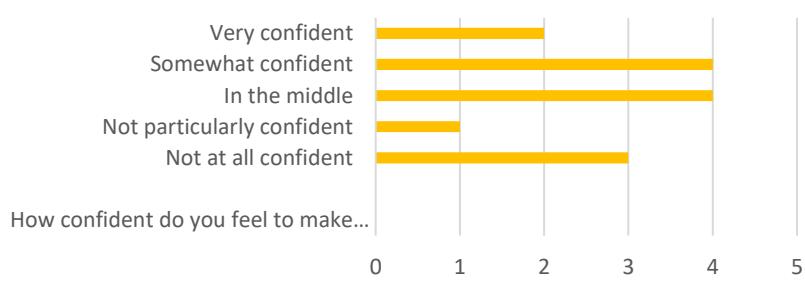
### What scale of whole house retrofit have you done?



### What energy performance data do you have?



### How confident do you feel to make the business case for whole house retrofit?



### What technical support do you need?



**APPENDIX 3 – EPC DATA SUMMARY BY STOCKHOLDER SIZE**

SHP Number and size	% Housing Stock Per EPC Rating							
	A	B	C	D	E	F	G	Unknown/no EPC Data
1 - Large	0.00%	12.50%	49.10%	30.00%	3.40%	0.30%	0.10%	4.60%
2 - Large	0.00%	5.31%	46.94%	39.61%	7.98%	0.15%	0.00%	5%
3 - Large	0.20%	24.50%	62.40%	12.60%	0.16%	0.14%	0.01%	0.00%
4 - Small	10.00%	10.00%	20.00%	40.00%	20.00%	0.00%	0.00%	0.00%
5 - Large	0.00%	0.00%	0.00%	41.60%	4.90%	0.50%	0.00%	53.00%
6 - Small	0.00%	0.00%	17.40%	21.70%	0.00%	0.00%	0.00%	60.90%
7 - Medium	14.62%	14.64%	14.64%	51.54%	4.00%	2.00%	0.00%	0.00%
8 - Medium	0.00%	25.00%	47.00%	24.00%	2.00%	0.00%	0.10%	0.00%
9 - Medium	0.00%	48.00%	25.00%	26.00%	1.00%	0.60%	0.10%	0.00%
10 - Large	0.30%	2.50%	51.90%	41.00%	3.50%	0.00%	0.00%	0.00%



Department for  
Business, Energy  
& Industrial Strategy



West Midlands  
Combined Authority



**APPENDIX 4 – PROJECT STATS**

	TOTAL	Total forecast
Per LEP, number of stakeholders in leadership positions engaged	142	6
Number of social housing providers worked with per (6) LEPs (total number) in detail	30	12
Number of current stock condition surveys documented - as part of plans for identifying archetypes	10	12
Number of social housing providers with 1 nominated archetype for further work - including those reporting their SHDF bid proposals	12	12
Number of plans developed to achieve EPC C in nominated archetypes - including those reporting their SHDF bid proposals	12	12
Events organised to raise awareness of and engagement with the research	6	6
Meetings with other housing sector stakeholders	13	0
Participation in national groups / housing sector retrofit events - questions asked, comments made referencing this research / issues arising	3	0



## APPENDIX 5 – RESEARCH TEAM AND INTERVIEWEES BY SECTOR - SEMI STRUCTURED AND INFORMAL INTERVIEW FORMATS

### INVITATIONS TO TAKE PART ISSUED VIA:

LEP based round tables  
Personal contacts  
SHAP E Newsletter  
ALEO Midlands newsletter  
WMCA facilitated fuel poverty and regional retrofit stakeholder meetings and working groups  
Personal introductions  
Via existing retrofit planning/delivery projects and SHDF and LAD bid teams

### INTERVIEWEES INCLUDED REPRESENTATIVES FROM:

2 large energy companies  
1 national contractor modelling deep retrofit  
2 consultancies developing decarbonisation plans for social housing stockholders  
3 large, 3 large SMEs and 3 smaller SME construction companies  
1 energy advice charity not previously engaged with SHAP  
3 Shire counties  
4 Met authorities  
1 District Council  
4 small stockholders  
6 medium stockholders  
20 large stockholders  
Of which 3 were ALMOs  
PHE  
Retrofit Academy

### SHAP RESEARCH PANEL

Rosemary Coyne  
Phil Beardmore  
Rachel Jones  
Simon Ross  
Jenny Christian

### MODELLING

Jenny MEA  
Duncan Sluce DECCC  
Charlie Baker Red Coop  
Michael Dyson Associates



Department for  
Business, Energy  
& Industrial Strategy



West Midlands  
Combined Authority



## APPENDIX 6 - TOOLS AND RESEARCH REPORTS REFERENCED IN INTERVIEWS

### DATA ANALYSIS APPROACHES REFERENCED

Parity Projects  
IRT DREeam  
SAVA  
Manual assessment and modelling

### OTHER APPROACHES/TOOLS REFERENCED AND IN USE BY INTERVIEWEES

BRE reporting  
Savilles  
Energiesprong financial model  
The Retrofit Pattern book, open source deep retrofit details

### REPORTS/RESEARCH REFERENCED IN INTERVIEWS

Beyond Decent Homes – SHAP 2009 - <https://shap.uk.com/resources/resources-pre-2018/>  
Community Green Deal – SHAP 2010 - <https://shap.uk.com/resources/resources-pre-2018/>  
Turning Housing into Homes Fit for 2050 – SHAP 2018 - <https://shap.uk.com/resources/resources-2018/Warm-Homes-Save-Lives> - ~SHAP 2020 - <https://shap.uk.com/fuel-poverty/>  
Scaling up Better Homes Yorkshire – 2020 – Red Coop with SHAP, University of Salford - <https://shap.uk.com/shap-projects-page/scaling-up-better-homes-yorkshire-2/>  
IPPR Stonewater All hands to the pump: A home improvement plan for England -  
<https://www.ippr.org/research/publications/all-hands-to-the-pump>  
Green Finance Institute - <https://www.greenfinanceinstitute.co.uk/new-report-on-local-authority-retrofit-finance/>  
LETI - <https://www.leti.london/>



## APPENDIX 7 – ADVICE ON AIR TIGHTNESS TESTING PROVIDERS FORWARDED TO ONE INTERVIEWEE

A request was made by a large social housing provider for information about air pressure testing for retrofit.

SHAP made enquiries of members who might have experience in this area and the following responses were received:



### BEIS SOCIAL HOUSING DECARBONISATION TECHNICAL ASSISTANCE PILOT

#### Air pressure testing query

Comments	Contacts
<p>Testing cost is typically 'per day' - so if you spend ages messing about in a house then you could be at it all day - or even doing so for 'half' a day can mean that your tester doesn't have time to do any other tests - so it can still be a 'per day' cost. That said last time we did testing in Nottingham we got 4 done (with messing about). I think David A spent a couple of weeks doing the Energiesprong pilots because understanding and resolving any leaks was key to them hitting their performance targets.</p> <p>Because testing is part of new build now there are more testers – but they don't all get that in retrofit you often want to play about and tape things up to understand where the air is actually going and what impact you might get.</p>	<p>Paul Jennings, Aldas Tel 07866948200 <a href="mailto:doorfanman@hotmail.com">doorfanman@hotmail.com</a></p> <p>TRADE BODIES ATTMA <a href="https://www.bcta.group/attma/members/air-tightness-testers/united-kingdom/">https://www.bcta.group/attma/members/air-tightness-testers/united-kingdom/</a></p> <p>UKBCA <a href="https://www.ukbuildingcompliance.co.uk/air-pressure-testing/">https://www.ukbuildingcompliance.co.uk/air-pressure-testing/</a> (they quote £95 for domestic property)</p> <p>BTS (Build Test Solutions) I have copied in Richard Jack (07810 771156). <a href="mailto:richard.jack@buildtestsolutions.com">richard.jack@buildtestsolutions.com</a> I think your questions are likely to be 'his bag'.</p>
<p>I think you might need to budget c.£500 per day? But I haven't been organising tests first hand for a long while.</p> <p>I have copied in Jon Moorhouse at Constructive Thinking – he might send you his guy that they use in lots of their things – i.e. used to the retrofit process of playing with tape etc to get understanding (not just getting a number generated).</p> <p>It might also be worth trying BTS (Build Test Solutions) I have copied in Richard Jack (07810 771156). I think your questions are likely to be 'his bag'.</p>	
<p>Jon@constructivethinking.co.uk Happy to have our details shared. We undertake strategic retrofit design, Archetype identification, Building Information Modelling / Building Energy Modelling, SAP optimisation, Thermal Bridging modelling (as well as usual architectural work) . Let me know if we can help you with any of the above.</p> <p>In terms of Air Pressure Testing, we often work with Peak Acoustics (<a href="https://www.acousticsurveys.co.uk">https://www.acousticsurveys.co.uk</a>), and have had a good experience with Focus recently. Both were happy to hang about all day whilst we hunt for points of leakage, so I'd recommend either.</p>	<p><a href="mailto:Jon@constructivethinking.co.uk">Jon@constructivethinking.co.uk</a></p> <p>(<a href="https://www.acousticsurveys.co.uk">https://www.acousticsurveys.co.uk</a>),</p>
<p>There's no parameter in a standard DEA grade EPC on air tightness as far as I'm aware. There's nowhere to put airtest results- you'd have to use Full SAP</p> <p>If you want to identify penetration then you need to do thermal imaging tests in the heating season with an infrared camera and either a smoke pencil or as I've found the back of the hand is actually more sensitive. The camera if good enough will identify penetration behind plasterboard, back of the hand round cold patches off the camera will identify more detail. Not sure how it'll help EPC unless done with full SAP instead of usual rdsAP software</p>	

