What are the Barriers to Retrofit in Social Housing?

Report for the Department for Business, Energy and Industrial Strategy

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29 January 2018

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Contents

The views expressed in this report are those of the interviewees and the authors. They are not the views of the Department for Business, Energy and Industrial Strategy, and they imply no policy commitments. Some interviewees are named in this report where consent was given.

Executive summary

There are barriers to thermal retrofit – both heating and insulation – that prevent social landlords from carrying out more retrofit work. This is important because improving energy efficiency in social housing is a key priority for the Government, which commissioned this study to improve understanding about the barriers.

We interviewed 40 social landlords and eight retrofit 'suppliers' who carry out retrofit work on social housing or are part of the retrofit supply chain, to discuss what the barriers are and how the Government could help them to overcome these barriers. The work was qualitative, not quantitative, and sought to provide more first-hand insights about issues identified in previous research. It aimed to identify directions for future research as well as taking evidence from decision makers working on social housing. We asked five main questions, used as the backbone for this report, to provide insights about the process of justifying and carrying out retrofits, how best to advise them about retrofit work, whether they are concerned about moisture issues, and whether they have been affected by the Hackitt Review, as follows.

1. What are the barriers to procuring retrofit work in social housing?

There are structural issues within both housing associations and local authorities that make it hard to link thermal retrofit work to routine maintenance. There are usually separate budgets for each, and often there are different framework contracts in place for "improvement" work (including thermal retrofit) and maintenance. Sometimes different people are responsible for each, and there are sometimes communication problems between them.

On a few occasions interviewees said that work was hampered by limited knowledge about thermal retrofit – either by the housing provider or their suppliers. Inevitably, limited funding was raised as an important barrier, and staff cuts in housing providers have also made it harder to undertake retrofit work. Several interviewees also said that retrofit is a low priority in their organisations, and replacing bathrooms or kitchens, or new homes, are seen as more important.

There are further barriers facing whole-house retrofit work as advocated in Each Home Counts (previously called 'The Bonfield Review') and PAS2030, the BSI's standard for carrying out energy efficiency upgrades on existing homes. Taken together, these mean it is almost impossible to carry out whole-house retrofits at scale.

2. How do social landlords approach procurement?

Most of the social landlords we spoke to outsource both maintenance and improvement work. They typically use framework agreements with suppliers, which allow them to appoint contractors directly or to run mini competitions to select contractors. This is much faster and simpler than doing Official Journal of the European Union (OJEU) procurement for each contract. The framework agreements often run for several years (two to five, at least).

Around half of the social landlords have dedicated energy efficiency budgets, and some of the larger ones (such as Clarion) use a Planned Works Strategy to target properties with low Standard Assessment Procedure (SAP) ratings and carry out retrofit work. In Clarion's case they prioritise homes below an 'E' SAP rating first, and their target is to raise them to at least a 'D' rating by 2035.

Conversely, smaller social landlords do not have dedicated budgets, and they are mostly focused on emergencies and repairs. Their approach is more ad hoc, driven by short-term needs.

3. What would drive more thermal upgrades (heating and insulation)?

Interviewees had many suggestions about how to drive more upgrades: 'Best In Class' guidance describing how to draw up maintenance and improvement contracts, and/or additional sticks and carrots to make retrofit a higher priority, and/or simplify the application process for Energy Company Obligation (ECO) funding.

Stock condition surveys are important in most social landlords' decisions to intervene and retrofit homes. Often they maintain databases of their stock, which commonly record when items such as boilers or windows need replacing. There may be opportunities for Government to work with the grain of condition surveys and databases – possibly by linking advice about retrofit to existing tools for managing stock surveys – like Parity Projects' CROHM service.

4. Are social landlords worried about moisture and condensation issues?

Interviewees were divided on this question. A majority said that they were a concern – but this ranged from a significant concern to a minor consideration. Mostly, they said that the risk of moisture and condensation would not put them off retrofitting homes. Five interviewees said they were unconcerned about moisture effects of retrofit work.

Many interviewees said that tenants have a significant role in avoiding or sometimes causing condensation problems, recognising that occupant behaviour often needs to change after retrofit work – especially relating to ventilation. Some interviewees said that it is challenging to educate tenants about changes they should make when their homes have been improved. Resources are only part of the problem, and funding alone would not resolve all the barriers to delivering behaviour change. Two housing associations have carried out moisture surveys of all or part of their stock to improve information about moisture risks. However, none of them said they routinely did formal condensation risk assessments as part of their retrofit work.

5. What impact has the Hackitt Review had?

The Grenfell Tower fire and the subsequent review of Building Regulations, fire safety and compliance have clearly had a major impact on social housing providers. Most interviewees are watching the Hackitt Review closely (the Interim Report was published very soon after the interviews took place, in November-December 2017). A handful of interviewees said they have postponed retrofit work pending the outcomes of the Review, but much more commonly the social landlords have transferred budgets that would have been allocated to retrofit and improvement work to fire safety reviews. Where necessary, they have also invested in improved fire safety measures, and in a few instances they have stripped off external wall insulation (EWI) where this was assessed as bringing unnecessary fire risk.

List of Acronyms	
ALEO	Association of Local Energy Officers
ALMO	Arms-Length Management Organisations
BEIS	Business, Energy and Industrial Strategy
BSI	British Standards Institution
CAR	Cambridge Architectural Research
CERO	Carbon Emissions Reduction Obligation
CERT	Carbon Emissions Reduction Target
CESP	Community Energy Saving Programme
CO_2	Carbon dioxide
CROHM	Carbon Reduction Options for Housing Managers
ECO	Energy Company Obligation
EPC	Energy Performance Certificate
EPS/XPS	Expanded or Extruded Polystyrene
EWI	External Wall Insulation
HA	Housing Association
KPI	Key Performance Indicator
LSGR	Landlord Gas Safety Record
MVHR	Mechanical Ventilation with Heat Recovery
OJEU	Official Journal of the European Union
PIR	Polyisocyanurate
PV	Photovoltaic
SAP	Standard Assessment Procedure
SHAP	Sustainable Housing Action Partnership
UPVC	Un-plasticised Polyvinyl Chloride
WUFI	Wärme Und Feuchte Instationär

Introduction

There are 3.9 million social housing units in the UK. [1] As well as building new, energy efficient homes, the sector has upgraded much of their existing portfolio to improve energy efficiency. Almost half (48%) of socially rented homes now have an Energy Performance Certificate (EPC) rating of A to C, which compares to 26% in the private rented sector and 24% of owner-occupied homes. A significant proportion of socially rented homes have been upgraded with improved heating systems, cavity-wall insulation, loft insulation, double glazing, energy-efficient lighting and draught-stripping.

However, there still remains considerable potential for further improvements to the energy efficiency of social housing, and in particular, there is a need to insulate solid walls and install floor insulation. These upgrades tend to be more complex, and often more expensive[2], than the 'low hanging fruit' that has already been completed in many cases.

Improving the energy efficiency of social housing is a key priority for the Department for Business, Energy and Industrial Strategy (BEIS). Past policy interventions did not achieve as much traction as hoped in social housing – partly because of very specific barriers to retrofit in social housing (such as the timing of decisions, and difficulties fitting into a broader context of maintenance and asset management). This reduced the energy and carbon-saving impact of past policies.

BEIS commissioned this study to improve understanding of the barriers to thermal retrofit in social housing. Specifically, the Department wants to understand how future support can be introduced in a way that meshes with funding cycles for retrofit work and practical considerations affecting this work (such as weather conditions that preclude upgrades). In this study, we use the term 'thermal retrofit' to represent upgrades to the fabric or systems of a home that may reduce energy use for heating.

Cambridge Architectural Research and Muon Events carried out telephone and face-to-face interviews with 40 social housing providers (local authorities and housing associations), and eight organisations involved in carrying out retrofit work on social housing or in the retrofit supply chain. We spoke to social landlords of different sizes and across different geographic locations – including urban/rural operators. We also spoke to people working on different operational functions in social housing: surveyors, asset managers, financial controllers, and retrofit specialists.

We explored five research questions drawn up by the Department about the barriers to retrofit and how to overcome them. These questions are used to structure this report:

1. What are the barriers to procuring retrofit work in social housing?
2. How do social landlords approach procurement?
3. What would drive more thermal upgrades (heating and insulation)?
4. Are social landlords worried about moisture and condensation?
5. What impact has the Hackitt Review had?

We recorded each interview in a searchable database held in Excel, and analysed the qualitative data from interviews using pattern-matching and frequency counts where appropriate. We have also written two short case studies to illustrate important findings.

Past work already sheds some light on the barriers to retrofit, but this report aims to go beyond simple numbers and understand the decisions, motivations, and other qualitative factors that drive retrofit procurement. We sought first-hand views from people who have commissioned and carried out the retrofit work.

[1] DCLG (2017) English Housing Survey: Headline Report, 2015-16. London: DCLG.
[2] J Palmer, M Livingstone, A Adams (2017) What does it cost to retrofit homes? Updating the Cost Assumptions for DECC's Energy Efficiency Modelling. London: BEIS.

Background: Existing understanding of barriers to retrofit work

The most recent Retrofit State of the Nation report[3] was published in February 2017, and this identified opportunities, challenges and progress within energy efficiency retrofit in the UK social housing sector. The State of the Nation report was based on a survey of respondents representing more than half of UK social housing. The survey suggested that although social landlords continue to take retrofit seriously, motivated mainly by tenant welfare, only 40% of them feel that retrofit is championed at board level (down from 60% in 2016). This is largely the result of rent caps, welfare reform, reduced local authority funding, right to buy, and pressures to increase housing supply.

The State of the Nation report identified a lack of funding and an unproved business case for retrofit work as the two main barriers confronting retrofit work. Uncertainty about Government policy was cited as a secondary barrier. As for drivers for retrofit work, the picture emerging was of fuel poverty and affordability of bills as the two most important pressures favouring retrofit projects.

At the end of 2017, there were 1,746 social landlords registered in England, 110 in Wales, and 192 in Scotland.[4] They vary enormously in terms of their size and remit, and this affects their drivers and motivations for carrying out retrofit projects. Local authorities typically face more stringent legislative requirements than traditional housing associations. Social landlords providing supported housing for vulnerable or elderly residents may also face different barriers from those providing homes for private rent.

Retrofit work by social landlords is also strongly influenced by the age and type of the housing stock they manage – with older, solid-walled homes often being more difficult and expensive to improve. Older homes sometimes bring more difficult aesthetic considerations – particularly if they are listed or in conservation areas. Flats can also bring greater complexity for insulation and heating upgrades – especially when some units in a building are privately owned while others are owned by social landlords.

Delivering thermal retrofit at scale in the social housing sector must be achieved in a way that is affordable and assured in terms of performance. The main gaps in current understanding about retrofit are the mechanisms and timing for retrofit decisions and investments, and how these decisions relate to asset management more broadly and maintenance work in particular. There are also gaps in knowledge about how social landlords use EPCs in decisions about retrofit work – do they carry out pre- and post-work EPCs? If not, how will they be able to respond to the proposal in the Clean Growth Strategy for a social housing energy performance standard of EPC 'C' by 2030?

The other critical gap in understanding is how the Government can best intervene to promote retrofit work in social housing. Much of the simple and low cost retrofit work has already been done. Meeting the Clean Growth Strategy proposals will require deeper and costlier retrofit measures. A better understanding of retrofit decision making and investments in social housing can help to deliver programmes more effectively. It will also enable better targeting of technical advice to decision makers and help deliver higher quality retrofit work.

Currently, under the Carbon Emissions Reduction Obligation (CERO), which forms around 30% of the Energy Company Obligation (ECO) spending, all households, including social housing, are eligible for support. Under Affordable Warmth – the element of ECO focussed on low income and vulnerable households – only social housing with an EPC rating of E, F or G is eligible.

The Government will shortly consult on the next iteration of ECO, due to run from October 2018 to March 2022. One proposal is to focus the whole of ECO on Affordable Warmth.

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[3] National Energy Foundation (2017) Retrofit State of the Nation: Low Energy Retrofit in Social Housing. Milton Keynes: NEF.

[4] HCA (2017) Current registered providers of social housing. London: HCA.

Methods

We carried out interviews with 40 representatives of Registered Social Housing Providers (including housing associations, local authorities, and Arms-Length Management Organisations (ALMOs), asking how they procure and justify retrofit work on properties they own. They were selected from CAR and Muon Events' existing contacts in social housing, by reaching out to the Association of Local Energy Officers (ALEO) and by requesting interviews with delegates at the HOMES Conference held in London on 22 November 2017. We also used three databases of social landlords, selecting organisations that were under-represented in our evolving sample – especially organisations based outside South-East England, and especially smaller social landlords. A full list of interviewees is included in Appendix 1.

Most of the interviews took 30 minutes, although about a fifth took longer – largely when the interviewee was prepared to speak for longer, and we used additional questions when time was available. A small number were shorter – when the interviewee was not able to speak for 30 minutes, or when they did not have sufficient knowledge/information to answer some of the questions. Most of the interviews were carried out by telephone, but a fifth were carried out face-to-face.

We used a core of seven questions of particular importance to the Department (the five questions above with two sub-questions), and a further 16 questions of secondary importance, when interviewees were willing to spend more time being interviewed. All questions are listed in Appendix 2.

Table 1 shows the geographical spread and range in size of the social housing providers that participated in this study. Interviewees were heterogeneous, and we would not suggest this is a 'representative' sample of social landlords or retrofit suppliers. However, we have carried out sufficient interviews (40), and a sufficient coverage of geographic regions and sizes, to be confident that we have captured the prevailing perspectives about barriers to retrofit. Our interviewees are responsible for managing nearly 700,000 homes across the country, which is around 18% of the UK's total social housing stock.

Size of portfolio	London	South	Midlands	North	Scotland	Wales and Northern Ireland
Small	x HA x ALMO	x HA x Council	x HA x Council	x Council	x HA x HA x HA	x HA x HA
Medium	x Council x ALMO	x HA x HA x HA	x Council	x HA x HA x ALMO		x HA
Large	x HA	x HA x HA	x HA x HA x ALMO	x HA x HA	n/a	n/a
Very large	x HA	x HA	x HA x HA		n/a	n/a

Table 1: Geographical and size distribution of social housing provider interviewees, 'x' represents one organisation. Small = less than 5,000. Medium = between 5,000 and 19,999. Large = between 20,000 and 49,999. V. large = more than 50,000. HA = housing association. ALMO = Arms Length Management Organisation.

We targeted interviews with those staff that would have the most knowledge of thermal retrofit activity within the organisation. These tended to be the energy and sustainability managers, or staff within the asset management team of the organisation. Exactly what constitutes a 'sustainability manager' varies between organisations, but they generally have responsibility for energy efficiency as well as other environmental issues including waste and recycling, ecology and biodiversity. They often have a role in new building work as well as retrofitting the existing stock, and they may or may not have past experience of procuring retrofit services. 'Consultants' are usually energy or construction experts hired for short periods to advise about energy efficiency work. They are typically a source of technical advice about what retrofit work to do, or how to do it, but sometimes they also provide

guidance about funding that is available and/or how to procure retrofit work. The breakdown of the interviewee job roles is shown in Table 2.

Role – main function	Number of responses	% of responses
Chair/Chief Executive	2	4%
Sustainability	16	33%
Asset Management	17	35%
External Consultant	5	10%
Supply Chain	6	13%
Other	2	4%

Table 2: Roles of social housing provider interviewees.

Alongside the interviews with social housing providers, we also interviewed 'suppliers' of retrofit services: contractors, materials suppliers, and consultants who had worked on retrofit projects for social housing. We sought to understand suppliers' perspectives on barriers to retrofit, and how to overcome them. We used a slightly modified interview schedule, with nine questions, also included in Appendix 2.

A smaller number of suppliers (eight) means that there may be views from suppliers that are omitted from this report, and we would recommend further engagement work with suppliers to add detail to the insights presented here.

What are the barriers to procuring retrofit work in social housing?

Social landlords are responsible for general maintenance of their homes, including the structure and exterior of the building, the heating system, plus pipework and common parts such as lifts and communal entrances. The larger landlords tend to run either 'responsive repairs' or 'planning investment' programmes, serviced by external contractors. Responsive repairs are reactive, for example, they may involve a callout to a contractor to fix a boiler that has stopped working. Then there are 'planned investments' or 'cyclical works' programmes, which involve the periodic upgrade or improvement of an element such as a kitchen or a bathroom. Linking thermal retrofit work to planned investment programmes could allow some of the associated costs such as labour costs and prelims, to be shared, reducing the overall cost of retrofit.

Figure 1 shows the barriers identified by the interviewees. A number of interviewees raised structural problems within their organisations that made linking thermal retrofit work with other maintenance work difficult. In particular, they said that separate budgets and contracts for maintenance work versus 'improvement work' (which is how they tend to think of insulation and heating upgrades) act as a barrier. Most of the social landlords we spoke to are in this position. Emma Bushell from Octavia Housing summarised the issue, saying that until recently, energy efficiency retrofit was seen as a different programme to standard works, carried out with a different budget and different team; it takes strong management and governance at senior level to link the two. One person said there are communication problems between those working on maintenance and improvement, and the benefits of doing improvement work in reducing ongoing maintenance costs are not recognised. He said communication between these parts of his organisation has improved, "but there is a long way to go".

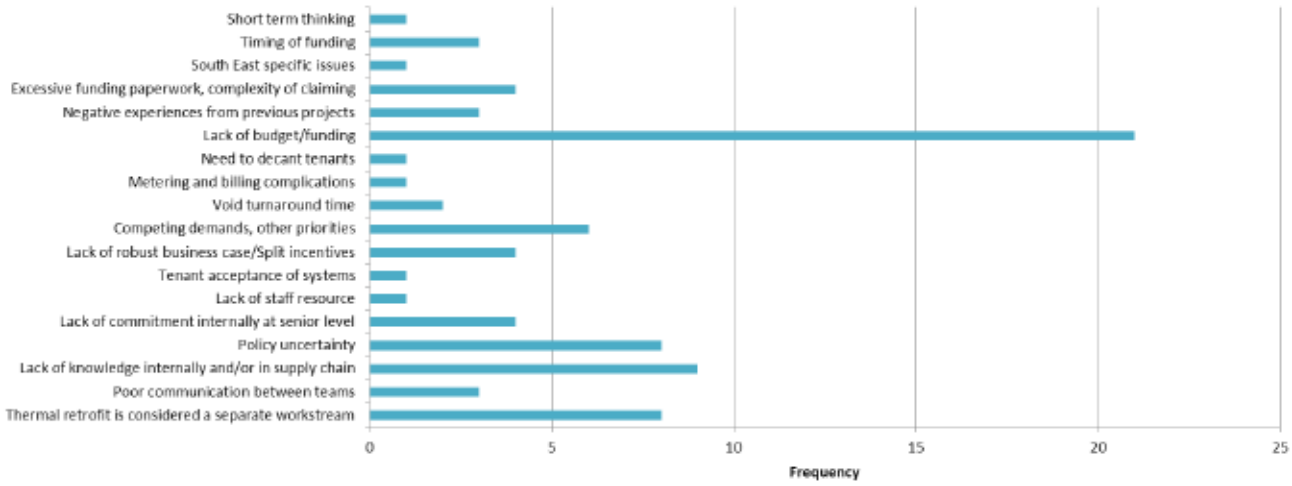

Figure 1: Barriers to retrofit mentioned by social landlord interviewees.

Another common theme to emerge was limited knowledge – either on the side of social landlords themselves, or among retrofit suppliers. Most larger organisations have a sustainability or energy manager (although this role is at risk in many organisations because of financial pressures), whereas small ones tend not to have such specialists in post. One interviewee said that standard contractors who carry out maintenance work often do not know how to carry out retrofit work. They often use sub-contractors to do this work, and these often do poor-quality work. Ian Bamforth, from Saxon Weald Housing Association, felt that it was difficult to source trusted and reliable expertise that would deliver solutions specific and appropriate to their organisation. Our interviews with the supply chain confirmed that knowledge about what retrofit options are possible is a barrier for housing associations, and it is hard for consultants to provide this without looking like they are pitching for work.

The additional, perceived cost of thermal retrofit work on top of existing programmes was mentioned several times as a barrier. Ian Bamforth also said that replacing items with thermally efficient versions

adds cost - both initial outlay and ongoing maintenance. The organisation may also need to bring in resources with specific technical expertise outside their current capabilities to manage the upgraded assets long term, adding more cost. Generally, social landlords recognise that retrofit work will bring additional ongoing costs, including tenant engagement, but these costs are not quantified. (Only one interviewee said that such costs were built into the financial model of maintenance costs.)

Also common was the observation that less funding generally for social landlords (especially because of rent caps and Universal Credit) has meant there are fewer members of staff available to focus on retrofit work. In one instance the loss of key individuals who were motivated to work on thermal retrofit hampered further work – sustainability and energy managers in particular. It is unclear who takes up the responsibilities of these specialist members of staff when they leave, if anyone, or how social landlords can recover from this loss of expertise. This, combined with a low priority placed on energy efficiency work by senior management, means that it is very hard to continue doing retrofit work. One interviewee said that energy efficiency is only taken seriously by social landlords when they have to act because of legislation. Further, he said that action on fuel poverty is seen as a nice thing to do, but it is not seen to be as important as asset management.

Around a third of interviewees said that new build projects carry more weight than improving existing homes, so there is pressure to spend whatever capital is available on building new homes. Ultimately it is a senior management decision to allocate budgets to new build or retrofit/maintenance work, and many of those who mentioned this said that new build takes priority. Social landlords might also sell off stock that is costly to maintain and may reinvest that income into stock improvement works, or they may purchase or build new properties as a means of diversifying their portfolio and generating higher returns.

For most of the organisations we spoke to, meeting the Decent Homes standard is seen as a more important priority than energy efficiency. For those that still need to take some properties up to Decent Homes standards, it is very hard to justify spending time and money on energy efficiency.

The 'split incentive' (whereby the social landlord pays the capital cost of thermal upgrades, but the tenant gets the benefit in terms of both improved comfort and lower running costs) was also mentioned several times during interviews, both by social landlords and by the supply chain, for example, Peter Sharman from principal contractors, Mullaley.

A few interviewees said that resident attitudes act as a barrier – especially for new forms of heating. Conan McKinley of Gentoo Group said that residents struggle with air-source heat pumps because they are accustomed to gas boilers and do not like to leave heating on most of the time as they perceive it to be expensive. Sometimes this means they tinker with the controls to increase the temperature, leading to a call out for an engineer, which increases maintenance costs for alternative heating systems. Billing can also be more complicated, especially for communal heating. Figure 2 shows that people living in social housing are considerably older than those in the private rented sector, on average - 27% of social tenants are over 65, compared with 8% of private renters. This may exacerbate the lack of acceptance of new and unfamiliar energy efficiency technologies.

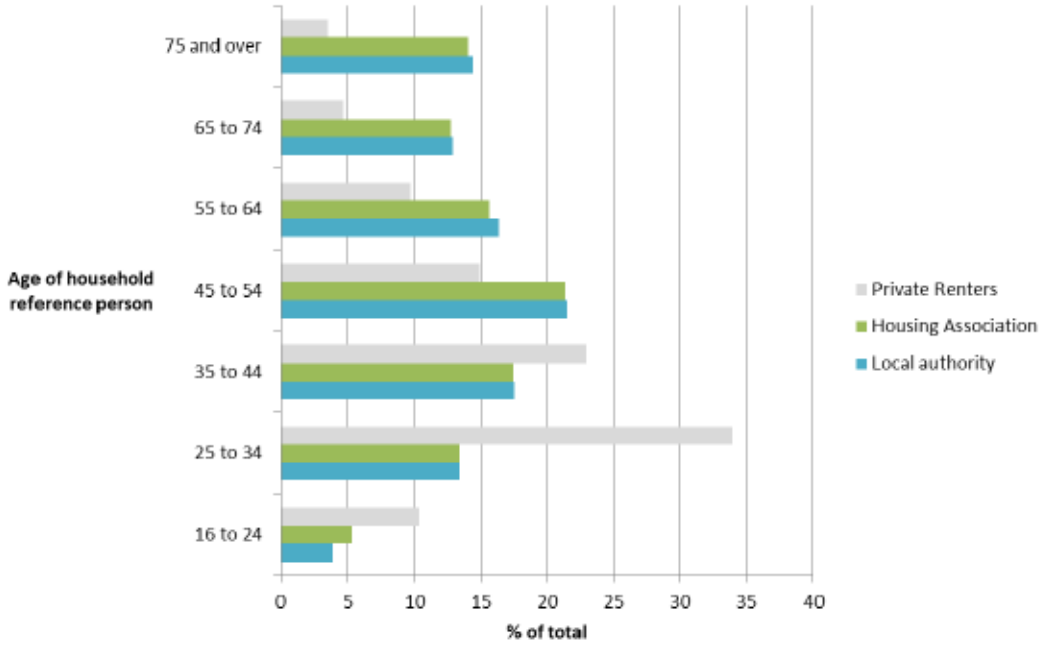

Figure 2: Typical age of tenants in social housing (housing associations and local authority housing) compared to private renters.[5]

There are some pressures that apply more intensely in London and the South East, especially regarding voids (empty properties waiting to be re-let). There is intense pressure to achieve fast turnaround times, which limits the time available for retrofit in comparison to the rest of the country.

Some interviewees, like Dan Archard from Clarion Housing Group, felt that external wall insulation is a particularly challenging retrofit option. It is difficult to integrate with standard works, he said, and it needs dedicated project management and surveying resources, which are often difficult for social landlords to find.

Interviewees also noted that Government policy often acts as a barrier, for two reasons. Firstly, because of the uncertainty created by frequent policy changes – decision makers in social landlords prefer to hold off carrying out work rather than carry out work that is no longer supported by Government. Rosemary Coyne, Co-ordinator of the Sustainable Housing Active Partnership, said that policy uncertainty undermines confidence in the schemes, making senior management and Boards wary of participating in future. In particular, when ECO was revised, many well developed schemes were pulled at the last minute because the rules changed, making them unviable – with the result that ECO providers did not sign contracts. Sometimes tenants had already been contacted to advise of imminent works. This causes low customer satisfaction and generates complaints to the housing provider, which is often one of the KPIs that they are measured on.

Secondly, there is the perception that policies are not integrated. For example, one interviewee said that Decent Homes did not cover insulation (in fact it did, although arguably other issues were more prominent). This interviewee said that this meant once a kitchen and bathroom is improved in a property there is unlikely to be another improvement under standard programmes for another 25 years.

Conversely, Martin O'Brien from Lewisham Council said that Lewisham were able to align thermal retrofit work with Decent Homes, which allowed them to do more upgrade work than they would have otherwise.

[5] DCLG (2017) Demographic and economic data on social and private renters, 2015-2016. London: DCLG.

How do social landlords approach procurement?

Social landlords tend to take an element-based approach to carrying out investment works rather than a whole house approach. Generally, high volume thermal retrofit works are procured in one of two ways (with the second less common):

- As separate programmes of measures to be delivered, for example, a provider might select a contractor to deliver loft insulation to all homes in a geographic area. These programmes may be procured through a framework or directly from the marketplace. It is difficult to procure works on an individual property basis, to achieve a minimum EPC rating, because of the different trades involved.
- Under the planned investment or responsive repairs contracts, where the contractor is able to deliver thermal retrofit measures on top of their standard works at their discretion, up to an agreed budget. In these instances, the contractor is usually then responsible for sourcing external funding to subsidise the cost of the works.

In most instances, the sustainability manager or member of the asset management team will produce a business case for approval by senior management and ultimately, the Board. The business case may be triggered by availability of external funding, or by corporate targets agreed internally.

Most of the social landlords we spoke to outsource both maintenance and improvement work. For some of them, this has not been a positive experience, and several interviewees complained about poor quality site work by external contractors.

Most of the social landlords (and all of the larger ones) have framework agreements with one or more contractors which allow them to run mini-competitions to select contractors for work. These are faster and easier to administer than full OJEU[6] tenders. Some social landlords work together and use shared framework agreements, like Orbit Homes, who use the West Mercia Framework. Using the framework, they can let a contract and start work in less than two months, compared to six months using a full OJEU competition. Framework agreements probably account for two-thirds of the retrofit work carried out in UK social housing.

Lewisham Council and its ALMO Lewisham Homes have a five-year framework agreement with just one principal contractor. They said this allows them to take advantage of funding whenever it becomes available, and so far they have used CERT (the Carbon Emissions Reduction Target), CESP (the Community Energy Saving Programme), ECO and the Green Deal Communities Fund for thermal upgrades.

The large social landlords Clarion Housing Group, which has 125,000 homes, has 10 framework agreements in total, covering five regions and split for planned maintenance and more spontaneous 'responsive repairs'. Across some of the framework contracts, Clarion's repairs contractors are empowered to highlight potential energy efficiency works when visiting a property, including loft insulation and cavity wall insulation, and then to request permission to undertake these works (Clarion allocates budget towards ad hoc energy efficiency measures). They install condensing boilers with a 15-year lifetime as standard. When upgrading electric heating, they install electric storage heaters with higher heat retention. They also use a Planned Works Strategy to deal with lower SAP rated properties, prioritising those below E-rating first. Clarion aim for all stock to be at least D-rated by 2025 and they have developed a costed strategy to deliver this target.

[6] OJEU is the Official Journal of the European Union. There are strict guidelines for public procurement in Europe, so large contracts must either be put out to competitive tender, advertised in the Official Journal, or through OJEU-compliant framework agreements. For the latter, the framework is advertised in the OJEU, so contractors in all countries of the EU have the opportunity to join.

Some social landlords, like Thirteen Group, procure through frameworks that are administrated by an independent procurement specialist – in Thirteen's case Prosper. They have used this framework to procure both EWI and cavity wall insulation.

Sometimes the framework agreements can be constraining, and for Orbit there are occasionally difficulties because the framework was originally intended to take advantage of ECO funding, whereas now ECO funding typically only meets 10-15% of the cost of external wall insulation work, for example.

Gentoo Housing has a slightly different model, where they split heating upgrades from insulation work. For heating work, they have their own internal workforce, with no 'procurement' as such. However, for insulation work they do put projects out to tender – nearly always combining insulation with roof upgrades (for loft insulation) or gable-wall work (for wall insulation).

St Albans and City District Council invite tenders in competitions every two years, and appoint contractors for two years. The only energy efficiency retrofit work they undertake is replacing old heating systems with A+++ condensing boilers, and old windows with A+ UPVC double glazing. This is part of the commitment they have as a local authority towards the Decent Homes standard.

One small housing association said: "Retrofit is viewed as an added extra. We are mostly focused on fire-fighting and getting repairs right." This interviewee said that they do not have a typical method of procurement, and it tends to be ad hoc, according to short-term needs.

How does this link to their business models?

Most social housing providers categorise heating retrofit works as being separate from insulation retrofit works. Social landlords are legally obliged to provide a working heating system in their homes, therefore heating upgrade work is seen much more as routine planned investment and is included within standard contracts. Norma Nyaulingo mentioned that Greenwich Council has a contract to replace all boilers more than 20 years old with a more efficient version. Installing double glazing to replace single-glazed windows is also considered to be standard upgrade work, rather than thermal retrofit.

For the majority of social landlords, the primary driver for carrying out insulation retrofit works is as a result of their social purpose, to reduce heating and electricity bills and alleviate fuel poverty for their customers. Ben James from Moat Housing said that this has a commercial benefit as well, since tenants with lower fuel bills have more disposable income, which means that they are less likely to be in rent arrears.

Insulation works are not typically seen as a method of extending the lifetime of assets or raising the value of the asset and as such, they are not accounted for within asset management forecasting. This means that insulation contracts are procured separately and without the same level of rigour as other planned investment contracts; they rarely have performance KPIs (key performance indicators); the clerks of works and other staff that would be responsible for checking standards have been let go following recent budget cuts; timing and size of programmes is driven by availability of external funding and they are the first programmes to be cut when a new priority arises, such as carrying out Legionella assessments. Steve North, from Wolverhampton Homes, said that the 1% rent caps brought major cuts to their Capital Funding Budget. They now need to manage the same number of properties with a reduction to their Capital programme budget of £622 million over 30 years, so have to be more streamlined in their approach. As a result of this and the reduction of grant funding, their energy efficiency schemes have reduced, as they are seen as "nice-to-have" rather than being mandatory for compliance.

An exception to this is Livin Housing Association, who have a large number of properties built from pre-cast concrete, some of which are failing because of concrete cancer. These were good candidates for EWI, driven by the need to protect the long term integrity of concrete at lowest cost, and minimal

disruption to residents, not necessarily by concerns about fuel poverty. Insulation suppliers, such as Soltherm, claim that the lifetime of external insulation is over 25 years, which could be a significant factor for social landlords when making decisions about disposing of their stock.

Another exception was Conan McKinley at Gentoo Group, who said insulation work is usually combined with roofing work (for loft insulation) or gable-wall work (for wall insulation). They do not usually procure insulation work alone as generally the stock has already been fully insulated.

Around half of social landlord interviewees had an internal budget available to carry out insulation retrofit works and so were not solely reliant on external funding. Many interviewees had specific EPC targets set within a corporate strategy, some had adopted EPC rating C as a target, following internal research or publication of the Clean Growth Strategy. Where the works are being driven by availability of funding, homes are insulated based on the measures that are available for funding, regardless of the eventual EPC rating. Where retrofit works are part of an overall strategy, homes would be insulated to at least the minimum target, but the whole element would be upgraded. For example, the landlord would procure works to insulate all of the external walls, even if insulating just two of the walls would be sufficient to reach an EPC C rating.

One interviewee said there is only a weak link between energy efficiency and their main business model. Their case is different from most social landlords, they said, because it is approached by a council that has identified a specific individual with specialist care needs. They then acquire a property and renovate it according to the specialist needs. This does not normally focus on energy efficiency, but they would normally use a modern efficient boiler as part of the work.

Stephen Edwards from the medium-sized (21,000 properties) Catalyst Housing Association said they are currently formalising a new asset management framework. They have a Planned Maintenance and Cyclical Works framework which runs until 2021. They are in the process of setting up a new Repairs framework, and in 2021 they will consider bringing planned investment work into the new framework.

The Livin Housing Association is currently introducing new targets for energy efficiency, following the release of the Clean Growth Strategy, for stock to be above EPC C-rating by 2030. Retrofit works are sometimes attached to a capital works scheme, where it makes sense to package the two together. Sometimes they are able to source external funding, e.g. they managed to get loft insulation 100% funded and loft top-ups (where properties were revisited) 30% funded.

Livin have an Asset Management Strategy with a five-year lifetime that has been running since February 2016. They say they actively manage stock, and have been using Net Present Value calculations, gross yields, and recycling of funds for nine years. They use asset management software to run scenarios and test future asset options, looking over a 30-year modelling period. For example, recent analysis suggested that uPVC windows should be replaced this year. On surveying, they found the window frames were in very good condition. They did some minor repairs and cosmetic touch-ups and tenants noticed no difference in performance. Livin's Board has now taken the decision to defer the upgrade for another 10 years. They have modelled the implications of that, and find overall savings, but they recognise they are likely to have increased repairs costs as a result.

Only one landlord, Solihull Community Housing, mentioned the need to reduce carbon emissions to avoid the worst effects of climate change as a driver for action. This perhaps explains why the final EPC rating seems secondary to completion of the measure.

What are the triggers to action?

The main triggers mentioned were:

- An EPC target included within a sustainability or asset management strategy
- Heating system replacements as part of planned investment programmes
- Window and door replacements as part of planned investment programmes
- Voids between tenancies, when property is empty and works can be carried out
- Political intervention internally (i.e. Board members prioritising certain projects) or externally (i.e. media attention)
- Availability of external funding, such as ECO.

One interviewee said that voids are an important trigger point (when a tenant moves out or passes away), at which point a property is brought up to the required standards for letting it if necessary (in Peabody's case this means an EPC 'E' rating). However, fast void turnaround times are a key performance indicator for Peabody, and this makes it harder to retrofit energy efficiency works while a property is empty. Also, the social landlord is only given one month's notice that a property may become void, sometimes less if it is due to a tenant emergency.

One interviewee said that there is sometimes a political push for doing retrofit work in local authorities: a councillor decides to do something, perhaps to address an area of deprivation or fuel poverty, or perhaps to meet CO_2 targets or to support regeneration in a specific area.

Conan McKinley at Gentoo Group said the main trigger for insulation or heating work at Gentoo is the need to do maintenance. For boilers, he said, they replace them as a matter of course every 12-15 years either straight swaps [like-for-like] or upgrades with better efficiency, as necessary. Gentoo are considering moving from replacing boilers every 12 years to every 15, because new boilers last longer. Mr Mc Kinley said his previous employer did not have this policy of pre-emptive replacement: they only replaced boilers on a reactive basis, which he said tends to be more expensive.

One interviewee also said that boilers are replaced responsively, either when they are deemed to be failing during their annual service, or when they break down. Previously boilers were replaced every 17 years, although a large proportion of boilers failed within this time, which is why they moved to a responsive approach. Taken with Gentoo's comments, this implies that new boilers are currently anticipated to last between 15 and 17 years.

Some social landlords said they use Parity Projects' Carbon Reduction Options for Housing Managers (CROHM) retrofit stock assessment service. [7] This is provided as an online tool to help social landlords design and implement strategic retrofit work, and for some organisations this triggers retrofit work.

One interviewee said that funding is usually the trigger, while another described two drivers: fuel poverty and asset management-sustainability modelling. For the latter, he said that properties with very low EPC ratings [likely to be solid-wall homes] were identified for disposal, while those just above the cut-off might be improved.

Orbit Homes' Investment Plan is to get all properties up to EPC band 'C' by 2030, using insulation and PV to get extra SAP points. They also upgrade boilers and windows when they replace them to get extra SAP points – Mark Jones at Orbit said they "try to integrate energy efficiency and replacement work when [they] can".

[7] http://www.parityprojects.com/professionals/crohm-retrofit-stock-assessment/

What are the intervention points?

Nearly all interviewees said their organisations have Asset Management Strategies running for between three and 30 years. These set out a plan for maintenance and replacement work, and sometimes retrofit work too. A minority of organisations also have Sustainability Plans, which are geared more narrowly towards environmental considerations, including energy efficiency and retrofit. One opportunity for intervening would be when social landlords come to write their next Asset Management Strategy or Sustainability Plan.

Around a third of interviewees also mentioned asset databases they maintain, which record when boilers, windows, etc. are likely to need replacement. This allows them to carry out preventative replacement interventions so that equipment and building components are replaced before they fail. Again, there may be opportunities here to filter for properties that are suitable for 'opportunistic' retrofit work, where significant building work is needed that could be combined cost effectively with thermal upgrades. Figure 3 shows some of the intervention points for building maintenance that could be used to facilitate thermal retrofit.

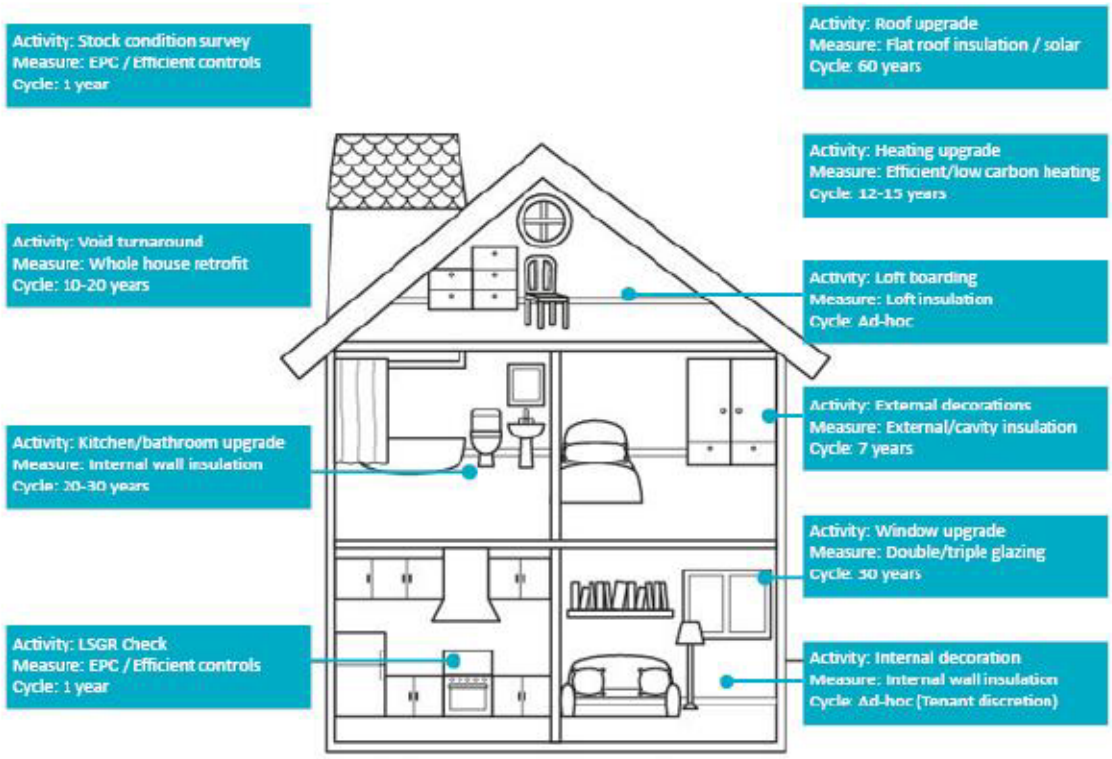

Figure 3: Retrofit intervention points in the planned investment and maintenance cycle. 'Activity' refers to actions that may be carried out by the social landlord as part of standard maintenance. 'Measure' refers to a potential energy efficiency measure. LSGR = Landlord's Gas Safety Record.

Two interviewees mentioned stock condition surveys, saying that properties are surveyed each year, but noting that it can take many years before the whole portfolio is surveyed, and several interviewees said that data about their stock condition remains poor. One of those who mentioned stock surveys said that these are used to identify [thermal upgrade] needs, and ultimately to action them.

Parity Projects' CROHM service may be another opportunity for the Government to intervene and provide advice and guidance. CROHM informs social landlords about which properties need work to be carried out, and when, using forward planning and a database of properties. This could potentially be used by Government agencies to target organisations that are about to undertake thermal upgrades, or other work that could be combined with thermal retrofit.

The Catalyst Housing Association takes advice about retrofit and other work from the Greater London Authority Renew Team.

What would drive more thermal upgrades?

Previous policies and funding regimes have been successful in incentivising social landlords to complete the "low hanging fruit" of thermal retrofit. These comprise the lower cost measures - loft insulation, draught proofing, cavity wall insulation, central heating installations and improved heating controls.

The remaining measures, such as insulation of solid walled homes, have the potential to deliver greater energy and carbon savings. However, they tend to be more complex, result in greater tenant disruption, and are more expensive to implement. These measures may require a different type of policy mechanism to deliver large scale retrofit than those that have gone before.

More engagement by senior management (especially Chief Executives and Finance Directors) in Social Landlords, would help to prioritise thermal retrofit measures within the organisation.

Mark Brown from Orbit Homes suggested that the Government could issue 'Best In Class' guidance for a combined maintenance and improvement contract that social landlords could use. The idea is that the Government could review contracts used in different organisations and select the best structure/clauses from each, then publish a model contract that others could use. This would be especially useful for smaller social landlords who have limited funds for legal expenses.

Jon Warren from Energiesprong UK, answering from the perspective of the social landlords he works with, said that sticks and carrots from Government are needed to prompt action. He also said landlords should capitalise on 'consumer pull' by making retrofitted properties attractive to tenants to overcome other barriers to retrofit. In the Netherlands, he said, this has been achieved by upgrading kitchens and bathrooms at the same time as thermal retrofit work. This means that tenants love retrofitted homes.

To continue the historic upgrading of energy efficiency of homes in the social housing sector, insulation of solid walls will need to be ramped up. At the moment, the guidance on whether this requires planning permission is unclear. Interviewees reported that the application of planning and permitted development criteria varies significantly between local authorities, and they suggested that Government could assist by producing consistent and coherent guidelines to be adopted at a national level.

Rosemary Coyne from SHAP suggested that external funding streams could cover technical advice. An example given was the Centre for Refurbishment Excellence in Stoke and Trent, which delivered Retrofit Coordinator Training that was helpful for those in social housing organisations involved in retrofit (equally valuable for clients, project managers and site supervisors, she said) Ms Coyne also suggested top-slicing ECO funding to pay for a central technical hub.

Robin Dunlevy from Solihull Council, and Edward Roper from Solihull Community Housing, suggested a three-prong offensive:

1. Take control away from the big six utility companies and give funding directly to local authorities, which would need to be ring fenced. In Mr Dunlevy and Mr Roper's view local authorities have a good track record in active delivery and this would drive a whole house approach.
2. Introduce funding for a reasonable length of time, avoiding the present problem of "running hot and cold". They said timing can be an issue, and short-term bidding processes do not always fit with capital programmes. Solihull recently completed a three-year Warm Zones project installing EWI. This was a smooth and streamlined process and worked well.
3. Focus on behaviour change. Solihull Community Housing has retrofitted most cavities and lofts with insulation. However, unless residents are supported in lifestyle changes, energy will still be wasted, they said. One problem is that behaviour/lifestyle support is never funded.

Greater policy certainty was requested by almost all of our interviewees. In the past, levels of funding for thermal retrofit were determined by the carbon price, which was highly variable over time and made it difficult to plan works with certainty. Many social landlords spent significant money and resources developing projects, only to have funding withdrawn at the last minute or been unable to claim because of changes to the rules. One interviewee mentioned the timing of funding deadlines, which usually coincides with the end of the financial year in March. This means that retrofit works often take place during the winter months, in difficult weather conditions.

ECO is not viewed positively. The criticisms were voiced most concisely by a representative of South Yorkshire Housing Association: "ECO is not a useful tool - very complex and confusing, it is a big, bureaucratic beast. Accessing ECO is more trouble than it is worth, especially as funding levels for social landlords are very low." Tim Peters, from Soltherm, concurred with this assessment. He said that clients often say that the cost of compliance with ECO is too high and search for alternative funding routes to bypass the system, which increases the risk of poor quality installations. Bevan Jones, from consultancy Sustainable Homes, also mentioned that the scheme has become convoluted and difficult to understand, and potential applicants are put off applying because it is so confusing to claim. (Note that ECO was reformed in 2015 and 2017, following public consultations, and BEIS tried to simplify the scheme.)

Are social landlords worried about moisture and condensation issues?

Interviewees were divided on this. A clear majority (20 out of 32 who answered) said that these unintended consequences were a concern for them, although this ranged from being a significant source of anxiety – which could potentially put them off retrofitting homes – to a minor consideration, and no real barrier to retrofit work. Five of them said they were not concerned about unintended moisture effects of retrofit work, which could put their assets (or the health of their tenants) at risk.

Many interviewees noted that tenants have a significant role in helping to avoid (or, in some cases, in causing) moisture and condensation problems. They noted that behaviour may need to be altered post-retrofit work – especially in improving ventilation, which may mean using fans or opening windows differently. Some interviewees also said they had some tenants who tended to under-heat homes – sometimes because they could not afford adequate heating – and this contributes to the risk of condensation, moisture and ultimately the risk of mould growth. However, a few also noted that insulation and improved heating should make it easier to maintain warm temperatures that will reduce the moisture risk. One interviewee added that installing an air-source heat pump and moving to constant temperatures helped to avoid moisture problems.

Three interviewees had encountered moisture problems linked to installing cavity-wall insulation (two of these were in tower blocks). In two cases, the problems meant the insulation had to be removed later, at significant cost. Four interviewees also said that it is too early to know whether retrofit will bring moisture problems – it will take a few years. One interviewee commented on stories that had appeared in the press about condensation in their homes.

Bernie McCullagh, from WM Housing Group, said that WM Housing really focused on damp and condensation. They employed external consultants to assess damp and mould issues in their stock and to provide training to front-line staff. They also got involved in a Sustainable Homes research project on damp and condensation and are providing moisture advice to tenants in properties with external wall insulation.

A representative from South Yorkshire Housing Association said they had recently carried out physical surveys of 80 properties where external wall insulation was fitted. They found problems of "thermal bridging, poor detailing, insufficient render thicknesses, faulty seals, incorrectly installed sills, and absent electrical conduit signage".

One interviewee mentioned problems of moisture/condensation following the installation of mechanical ventilation with heat recovery (MVHR) in existing properties.

Nearly all interviewees said that moisture problems had not prevented or delayed thermal retrofit work. Lisa Lloyd from the Rhondda Housing Association in Wales was an exception: she said they have a number of properties with very thick traditional stone walls (around 450 mm) which naturally hold moisture, so they would not consider external wall insulation on many of their properties as a result. In these situations the thermal improvement would be minimal and more detrimental than beneficial.

None of the interviewees mentioned carrying out formal calculations of the condensation risk in their properties (e.g. the Glaser method or WUFI, see[8]). There may be a role here for Government to provide information about risk-assessment techniques.

Tom Jarman, from Your Homes Newcastle, pointed out that most organisations do not understand in detail how poor retrofit specification and installation is linked to turnover, customer satisfaction and cost to rectify. Therefore issues are not fed back coherently to the teams responsible for specification.

Turning to our interviews with suppliers, Bevan Jones from Sustainable Homes said they are currently carrying out a research project called Breaking the Mould, using "big data and machine learning to understand where damp and mould are likely to occur". "One early finding," he said, "is that the density of the home population using the rooms is a key factor, not necessarily the total number of people living in the home." That is, number of people per square metre is more important in predicting moisture problems than the total number of occupants.

What impact has the Hackitt Review had?

The Grenfell Tower fire and its aftermath have clearly had a major impact on social landlords, especially relating to external insulation of towers and aluminium cladding systems. Most of the people we interviewed are watching the Hackitt Review into the Grenfell fire very closely, and some referred to the interim report that is due in early 2018. In reality, the fire itself and the number of deaths resulting from the fire are more prominent in interviewees' minds than the ongoing review. However, a small number did report that thermal retrofit work has been placed on hold until the findings of the Hackitt Review are published. Mark Brown of Orbit Homes said: "We are watching the effect on Building Control. We have changed the insulation material we use, so now we only use mineral wool (accepting we'll need thicker insulation)."

More commonly, interviewees reported that their organisations are holding money in reserve, or have transferred budgets normally allocated to energy retrofit and other improvement work to fire safety reviews and fire safety upgrades. This is true even for social landlords that do not own any towers.

One interviewee said: "We have not been put off [EWI by the Grenfell Tower] but we would think carefully about the system used. We would think twice about EPS/XPS (expanded or extruded polystyrene) systems but we are happy to use PIR." Norma Nyaulingo from Lewisham Homes said that Lewisham have 60 to 70 buildings of six storeys or more. Following testing, three of them will need to have the EWI cladding removed, meaning they will return to the original SAP rating.

Installing sprinklers in tall buildings could become a major impediment to doing retrofit work. Steve North from Wolverhampton Homes said that sprinklers will need to be "picked up by the Capital Investment Budget, if the works to install sprinkler systems becomes mandatory this will mean that energy efficiency projects will fall further down the order" [because they are seen as nice-to-have rather than mandatory].

[8] https://wufi.de/en/software/what-is-wufi/

The WM Housing Group is reviewing budgets, pending the outcomes of the Hackitt Review, in case they have to carry out remedial work. Others, including the Sutton Housing Partnership, are awaiting the outcomes of the Review before doing any more retrofit work – because of the uncertainty about future regulation.

Discussion

Social landlords provide a range of services. They are the country's main provider of homes for affordable rent, they provide supported housing with specialist programmes for vulnerable people, and they are also developers of new homes. Even when solely considering their existing homes and making the case for retrofit, they must balance the need to provide a warm and healthy living environment for their tenants, without compromising affordable rents and while preserving the value of their assets and architectural heritage. They must consider applying new and emerging technologies without taking on unacceptable risk and with minimal disruption to their tenants. All of this must be achieved against a backdrop of limited financial resources, policy uncertainty, lack of skills and under-developed supply chains.

Our results largely agree with those from the 2017 State of the Nation report carried out by the National Energy Foundation, Capita and the University of Salford. The sector is at different stages in terms of how much of their portfolio has been tackled, but it is investing in thermal retrofit. Many organisations are funding this through internal budgets and the aspirations of the Clean Growth Strategy have been reflected in several corporate strategies.

Retrofitting for tenants

Thermal retrofit is on the agenda internally because of its potential to reduce fuel poverty. However, since there are no legislative requirements for thermal retrofit, it is not one of the highest priorities and is often at risk of being cut from stretched asset management budgets which, since the rent caps introduced in 2015, have been tasked with doing more with less.

Almost all interviewees said that their organisations prioritised kitchen and bathroom replacements over thermal retrofit work – sometimes because their tenants put more weight on kitchens and bathrooms, and sometimes because of Decent Homes. Several housing associations had also acquired homes from the local authority as part of a stock transfer, which came with contractual requirements to prioritise the upgrade of kitchens and bathrooms.

In some respects, Decent Homes was a missed opportunity to carry out thermal retrofits in kitchens and bathrooms (and arguably other retrofit work), when contractors were already going to the properties. Most kitchens and bathrooms are on 30- or 40-year replacement cycles, so they will not have any more work done on them for decades. A few social landlords do still have a significant number of homes that require new kitchens and/or bathrooms, but without changes to funding or legislation it is unlikely these will be linked with any thermal retrofit work.

In many cases, insulation works are seen as distinct from heating upgrades (which are part of established maintenance programmes). Insulation programmes are often opportunistic and driven by available funding. Arguably, this separation limits the scope for whole-house improvements, and it means that the full economies of a new heating system may not be realised because it is larger than it needs to be if the building were insulated at the same time as replacing heating.

Around a third of interviewees also said that the Standard Assessment Procedure, SAP, is a blunt instrument and not always reliable. This makes it more difficult in some cases to justify and fund retrofit work. For example, Helen Cameron from the Albyn Housing Society in Scotland said: "We have non-traditional stock where we cannot obtain funding for improving the building fabric because [homes] have gas heating which gets a good SAP score, but the thermal inefficiency of the fabric is poor so the tenants are heating the air. There needs to be a fabric assessment to target poor performing buildings (taking the heating out of the equation). This would have a real impact on fuel poverty."

Paul Ciniglio from consultant Boulter Mossman BM3e (and who previously worked at First Wessex and the Radian Group social landlords) said, like several other interviewees, that most social landlords are geared towards building new homes. This means that revenue from stock disposals and Right to Buy sales normally goes to fund new builds. However, if this could be changed – for example, if social landlords were required to invest, 25% of stock disposal income and Right to Buy sales proceeds into upgrading the existing stock – this would make it much easier to fund retrofit and other improvement work.

Social landlords are also under pressure to report minimum void periods (when properties are empty). This acts as a further barrier to more time-consuming retrofit measures because they are discouraged from leaving properties vacant – even when retrofit work would often be simpler when there are no residents in a home.

Forces of change on social landlords

Restructuring in social housing has been painful, but there is some good in the restructuring too. On the one hand, many organisations have recently made their sustainability managers redundant. The 1% rent cap reduction caused significant cuts to asset management budgets, forcing landlords to do more with less. A linked issue is that thermal retrofits are not perceived to add value to assets, and any investments are unlikely to increase the possible sale price of Right to Buy homes. However, at the same time, many housing associations are merging – bringing a greater ability to borrow and grow.

One interviewee said there could be opportunities to take advantage of investment funds now these funds face public pressure to divest from oil and gas and invest in more socially or environmentally beneficial assets. There is now greater awareness of both fuel poverty schemes and the opportunity to achieve carbon savings by carrying out retrofit work, and profitable investments in renewable energy resulting from Feed In Tariffs may have helped some investment funds to consider non-traditional investments with an energy orientation.

Stephen Edwards, from Catalyst Housing Association, said that losing the Code for Sustainable Homes and financial incentives for improvements have made it more difficult to make a business case for thermal retrofit work. A number of interviewees also felt that securing ECO and other sources of funding for retrofit is unnecessarily complicated. Andrew Kilpatrick from Caledonia Housing Association in Scotland said that having a single source of funding, and one that will be in place long term, would help to encourage retrofit work.

Interviewees generally expressed limited awareness of what funding is available. A project surveyor from one housing surveyor was clearly unaware of funding for off-gas properties. Various respondents mentioned other pots (National Grid, Warm Front) but no-one seemed clear exactly what was available or how to claim it.

Mark Brown from Orbit said: "The Government could look into providing a suite of guidance documents about insulation, performance based, assessing fire, moisture, and other issues." He said something like the old Best Practice Programme would be useful. In a similar vein, a supplier interviewee said that it can be difficult for suppliers to provide advice to social landlords without being perceived as touting for work. Government could help to provide guidance about what retrofit options are available, and the pros and cons of each, without any commercial motivation behind the advice.

Another suggestion is that the Government could become more active in the market for procuring retrofit services in social housing. The idea is that Government could coordinate bulk purchasing by social landlords to get better rates for thermal upgrades. For example, the Government could ask organisations to declare at the start of each year how many boiler replacements, cavity wall fills, or rendered EWI installations that each one wishes to undertake that year. Then the Government (or one of the existing procurement framework organisations) could run the procurement competition to

bulk purchase all of these retrofits. This should bring economies of scale, and it would also allow suppliers to gear up for larger retrofit projects, which might encourage innovation and investment in methods of delivery and training operatives.

Government could also provide information about condensation risk assessments, using WUFI or the Glaser method. Another interviewee suggested Government support for retrofit materials manufacturers in the UK (and locally) so social landlords do not have to import all the materials they use for retrofit work – acting as a stimulus to job-creation and regeneration.

One interviewee also said it would help to address uncertainty in investment decisions if the Government could provide information about future regulations for social housing – especially fire safety – in the wake of the Grenfell Tower disaster.

Conclusions and future work

Very seldom are the barriers to retrofit technical. Unsurprisingly, most interviewees cited funding as the biggest single barrier, but many also said that skills shortages and lack of knowledge about how to undertake thermal retrofit work acted as impediments too. Energy efficiency is seen as a nice-to-have part of corporate social responsibility rather than a financial imperative, which means it is usually a very low priority. There is also uncertainty about what other sources of funding are available apart from ECO, and how to apply for them.

There are significant shortcomings with ECO, and many social landlords prefer to fund retrofit work without jumping through complicated application hoops with little certainty that funding will be forthcoming. Changes to ECO, which are made through a public consultation and legislative changes, have also made decision makers in social housing sceptical, interviewees said, and "created a boom and bust climate" which "encourages cowboy suppliers" and poor workmanship.

There is also a conflict between the top-down pressure to build more new homes, against gentler recommendations without regulation or funding to retrofit existing social housing. Similar tensions exist between, on one hand, encouraging electric to gas conversion while, on the other, pushing electrification of heating. The same applies to capping rents while also expecting social landlords to invest in their stock.

Most of the easy thermal retrofit work has already been done. Many interviewees said the same old policy approach is not going to work to encourage harder, more expensive works, especially without additional funding. Most social landlords want consistent and reliable policies and support to be able to fund their own works, whether that is through skills training, or knowledge on how to produce a viable business case.

Advice about how to change the behaviour of tenants is also critical, but this is not covered by funding, so hardly any organisations are able to do it. Also critical is Post-Occupancy Evaluation, specification writing, and contracts, none of which is included in the funding available.

There is a very specific issue around external wall insulation, which is going to be necessary to achieve the Government's EPC aspirations for social housing. One interviewee said that someone in Government will have to make the hard decision soon about where the balance sits between the need to preserve architectural heritage and the need to reduce carbon emissions - and communicate this widely and consistently.

At the same time, there is a major skills shortage, and social landlords' aspirations for whole-house solutions are virtually undeliverable without multi-skill contractors.

The key audiences for encouraging greater thermal retrofit work in social housing are asset managers, sustainability managers (where they still exist) and those above them on the Boards of social landlords. The Boards set the strategic direction, and if this does not include addressing thermal

performance of existing properties, it stymies the ability of asset managers or sustainability managers to undertake thermal retrofits.

Regarding interventions, as well as clearer and more widespread communication about retrofit being needed generally, interviewees said Government could push the point that apart from social benefits, retrofit has commercial and operational benefits for stock too, including reducing running costs for tenants, complaints, and maintenance costs. Retrofits and quantified benefits should be included in five-year asset plans and 30-year business planning. (See also Sustainable Homes' Touching the Voids report[9].)

The Homes and Communities Agency already requires social landlords to submit financial planning information. One interviewee suggested requiring some energy efficiency information to be included in the asset planning submissions as well, as an easy way of making social landlords take it more seriously.

The Grenfell fire caused budgets to be put on hold and delayed works in some cases, but this mainly applied to organisations that have towers.

Most social landlords are aware that damp and condensation can be an issue affecting insulation work, but hardly any are doing anything about it apart from weakly defined tactics such as choosing good contractors or careful design. Only two of the interviewees had suffered major damp issues themselves, and these were both linked to cavity wall insulation rather than EWI.

A number of additional research questions emerged from this modest project, offered here as suggestions of future work:

- More qualitative research of supplier perspectives (to add to this small sample)
- How best to convey (retrofit) information to social landlords and their suppliers
- How to support social landlords in making a business case for retrofit investments
- How to quantify fuel poverty benefits from retrofit work – if this is a major level asset managers can use to justify retrofit work
- What 'best in class' retrofit contracts look like (and/or contracts that link maintenance and energy upgrade work)
- How SAP could be reworked to make it easier to justify retrofit work on homes supplied with gas heating fuel.

[9] Sustainable Homes (2017) Touching the Voids: The impact of energy efficiency on social landlord incomes and business plans. Kingston Upon Thames: Sustainable Homes.

Case Study 1: Solihull Council

Solihull Council's medium sized portfolio of around 10,000 homes is managed by an Arms Length Management Organisation (ALMO). The organisation has a Home Energy and Affordable Warmth Strategy, which aims to reduce fuel poverty throughout the town, to improve the energy efficiency of domestic dwellings in the borough and to promote the use of appropriate low and zero carbon technologies that help to reduce carbon emissions (see Figure 4).

They are in the process of approving a five-year asset management strategy, which includes targets to achieve at least an 'E' rated EPC for all properties by 2021/22. The strategy looks at potential investment needed for the stock over the next 30 years and assumes no external funding will be needed to subsidise works.

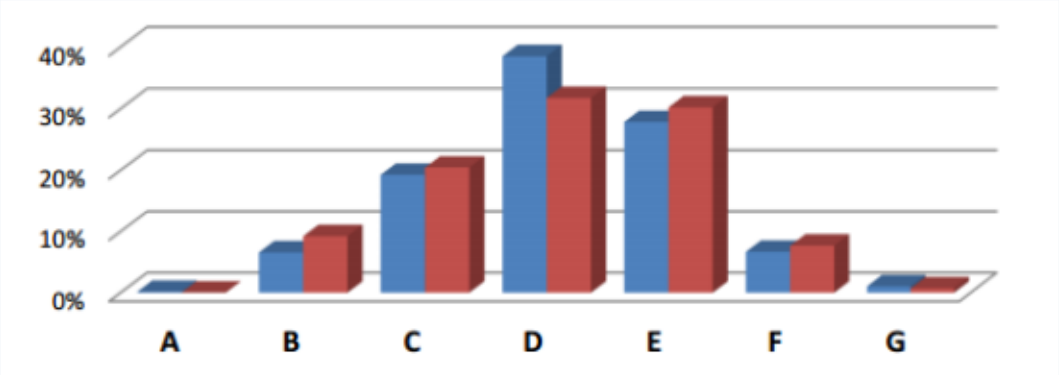

Figure 4: Change in EPC rating from 2013 (red) to 2015 (blue) for Solihull Homes

Historically, upgrades to heating systems have been seen as a separate work stream from energy efficiency retrofit works, although it has been possible to link them should funding streams require this. Heating upgrades are carried out by the Council and ALMO's strategic partnering contractor for mechanical and electrical work. This contract covers installation, preventative maintenance and response repairs. Energy efficiency retrofit projects, i.e. those involving insulation, have previously been driven by availability of external funding. These are typically procured on a competitive tender basis, by inviting Expressions of Interest from the marketplace and selecting the most appropriate tender, based on cost and quality criteria. Opportunities have arisen that are "too good to miss," for example, external wall insulation was fitted to 37 high-rise blocks and this was 100% funded through ECO by British Gas, one of the big six energy suppliers.

The works were considered a success – residents felt that their homes were warmer and the improved appearance of the block has given the neighbourhood a boost.

On some occasions, elements of the standard investment programme have been accelerated to take advantage of funding deadlines, resulting in the year's programme being condensed into eight months. Solihull Community Housing has experienced this scenario several times. The result is a greater focus on works delivery and production deadlines – sometimes at the expense of complementary interventions, such as providing advice to residents on lifestyle changes that would maximise the energy and carbon savings generated by the works, or monitoring the quantitative changes in energy use. The stop-start nature of thermal retrofit policy, and the complexity of funding mechanisms such as ECO, were raised as deterrents to designing retrofit programmes. The organisation manages a relatively large number of high-rise blocks and following the recent Grenfell Tower fire, they reviewed the external wall insulation systems that have been installed. They have a heightened awareness of the potential fire-safety risks but have no plans to cancel any proposed retrofit projects.

Case Study 2: Octavia Housing

Octavia is a not-for-profit housing organisation providing thousands of people with affordable homes in central and west London. The organisation manages nearly 5,000 social housing homes.

It is committed to sustainable building and was responsible for the UK's first retrofit Passive House in 2010. More recently, Octavia was awarded the Sustainable Housing Provider of The Year award at the 2017 SHIFT awards.

Following stock scenario modelling using the CROHM tool, Octavia set an ambitious target for all stock to achieve at least SAP 69 by 2023. The less complex retrofit measures are being tackled under a rolling seven-year, cyclical works programme. This includes cavity wall insulation, loft insulation top-ups to 300mm depth and replacement of boilers with A-rated models. The organisation says it is planning to survey the stock next year to confirm that all cavities have been filled with insulation and anywhere where the insulation has failed will be refilled.

Most of its remaining properties will be complex and costly to retrofit. The stock includes many solid walled, street front Georgian properties, which can be considered "hard to treat." Around 60% of the stock is pre-1918, over half of which is located within conservation areas and requires planning permission to insulate externally. The planning process for this is lengthy and timescales are difficult to predict. For example, with one group of properties it took over 18 months to obtain planning permission from the local authority to be able to install external wall insulation on the rear façade.

Where external wall insulation will not be permitted, Octavia intends to install internal wall insulation when the property comes up as a void. The target for standard void turnaround time is seven days or 20 days for a major void, which may be difficult to achieve if installing internal wall insulation. Until recently at Octavia, thermal retrofit was seen as a different programme to standard cyclical works. Through strategic integration of budgets and work programmes the organisation has been able to transform this approach and combine resources jointly on its key ambitions of tackling fuel poverty and reducing environmental impact.

Octavia has had some challenges with sourcing external funding for thermal retrofit in the past and highlighted that ECO can be complex, time consuming and difficult to access. For the most recent batch of EWI retrofit projects, they were unable to claim any ECO funding because of last-minute changes in the evidence requirements; a new performance calculation was introduced that had not been included at tender stage. The organisation also feels there is a lack of information about available funding and there is a mismatch in objectives and metrics between companies offering funding for carbon and social landlords that need to carry out specific works. Octavia has decided that for most projects, it is more cost effective and less risky to fund thermal retrofit works themselves. Difficulties with sourcing suitable insulation providers was also mentioned, which may be due to some suppliers leaving the market because of the constant variations in policy.

Since Octavia manages predominantly street properties, it has not been affected by the Hackitt Review. Most leaseholders reside in newer buildings and so programmes are not affected by the need for Section 20 consultation.

Appendix 1: List of interviewees

Name	Organisation	Geographic Coverage	Number of homes managed
Albyn Housing Society Ltd	Housing Association	Scottish Highlands	3,000
Boulter Mossman (previously social landlords)	Consultant + Housing Association	National	n/a
Bridgewater Housing Association	Housing Association	Scotland, Erskine, Renfrewshire	850
Bro Myrddin Housing Association	Housing Association	Carmarthen (Wales)	870
Caledonia Housing Association	Housing Association	Scotland	4,000
Care Housing Association	Housing Association	Lancashire (North)	n/a
Catalyst Housing Group	Housing Association	London and the South East	21,400
Chelmer Housing Partnership	Housing Association	Essex (South)	9,000
Clarion Housing Group	Housing Association	National (Midlands, South, London)	125,000
Cornerstone Housing	Housing Association	Exeter (South)	1,400
Energiesprong	Other	National	n/a
Gentoo Housing	Housing Association	Sunderland (North)	29,000
Greater Manchester Combined Authority	Local authority	Manchester (North)	n/a
Gwalia	Housing Association	Swansea (Wales)	5,000
Home Group	Housing Association	National	55,000
Hundred Houses Society	Housing Association	Cambridge (East)	1,400
Lewisham Council	Local authority	London	16,000
Lewisham Homes	ALMO	London	16,000
LHC	Other	London (South)	n/a

Moat Housing Association	Housing Association	South	23,000
Orbit Homes	Housing Association	National (Midlands, East of England, South East)	39,000
Peabody Housing Association	Housing Association	London	55,000
Riverside Group	Housing Association	National (England)	55,000
Solihull Council / Solihull Community Housing	Local authority / ALMO	West Midlands	10,000
St Albans City District Council	Local authority	St Albans, Hertfordshire (South)	5,000
Sustainable Housing Action Partnership	Other	Midlands	n/a
Thirteen Group	Housing Association	North Tyneside to York (North)	34,000
West Lancashire Borough Council	Local authority	Lancashire (North)	
WM Housing Group	Housing Association	West Midlands	30,000
Wolverhampton Homes	ALMO	West Midlands	23,000
Your Homes Newcastle	ALMO	Newcastle (North)	28,000

Table 3: Social Landlord interviewees.

Name	Type of organisation
Sustainable Homes	Consultancy: manages SHIFT index (sustainability rating system for social housing)
ARP Energy Services	Contractor
Soltherm External Insulation	EWI suppliers
Agility ECO	Consultant
E.ON	Energy Supplier
d3 Associates	Consultant
Mullaley	Principal Contractor
Adecoe	Consultant

Table 4: Supply chain interviewees.

Appendix 2: Interview schedules for Social Landlords and Suppliers

Interview Questions for Social Landlords

A. How many units are in your portfolio?

B. Which geographical areas do you cover?

C. Could you describe your role in the organisation?

1. Can you describe how you procure thermal retrofit work (energy efficiency and heating)? (Including how it links to business models, what are the triggers to action, and what are the opportunities for doing thermal retrofits)
2. Do you have a long term asset management strategy? Over what time period?
3. Do you ask your suppliers about how retrofit work will affect Energy Performance Certificate (EPC) ratings? (Do you rely on them for other technical advice?)
4. If you were in government, what policies would you put in place to encourage and support thermal retrofit work in social housing?
5. What barriers have prevented you from linking thermal retrofits to normal maintenance work?
6. Are there concerns about the risk of damaging assets – especially through moisture and condensation effects – affecting your energy efficiency work? (How?)
7. How have the ongoing Building Regulations and Hackitt reviews following the Grenfell fire affected your plans for energy efficiency work, if at all?
8. [If time is available] What are your views on the extension of ECO Affordable Warmth to social housing?
9. [If time is available] Considering two recent retrofit projects you were involved in, what contribution did your organisation make on top of the ECO funding?
10. [If time is available] Do you have any comments about these aspects of energy efficiency work?

a) What proportion of your stock you have retrofitted	b) Why you have not retrofitted 100% of your properties	c) Whether works were carried out as part of an asset management plan, or sustainability strategy
d) How often you carry out major work (like new kitchens or bathrooms) on homes	e) How often you carry out thermal work on homes	f) Whether you have done work explicitly geared to achieving an EPC 'C' rating
g) Accessing CERT/CESP/ECO funding to subsidise work	h) Whether you could fund retrofit without external funding like ECO (how)?	i) What percentage did you contribute to the cost of works
j) How do you rate existing incentives for retrofit (LIKERT SCALE: 1 VERY POOR TO 5 VERY GOOD). Please explain.	k) Your satisfaction with outcomes of your retrofit work (LIKERT SCALE: 1 VERY POOR TO 5 VERY GOOD). Please explain.	l) How you know that retrofit work has been successful
m) Did the eventual cost of works match predictions?		

Interview Questions for Supply Chain

1. Do you prefer contracts with private landlords or social landlords – why?
2. Do you find projects funded by ECO more difficult to deliver – if so why?
3. When working with RSLs, what do you regard as good practice on their side, that helps you to deliver efficiently and to a high standard?
4. What barriers have you found in engaging with social housing organisations to carry out retrofit projects?
5. What consideration is given to tenant engagement? (for example teaching them about heating controls, when to open windows, etc..) Is this driven by the contractor, or is it the landlord's responsibility?
6. Do your social housing clients ask your advice about moisture issues?
7. Do your social housing clients ask your advice about the ongoing Building Regulations and Hackitt reviews following the Grenfell fire?

LIKERT QUESTIONS

8. How do you rate the outcome of your last thermal retrofit (1 VERY POOR TO 5 VERY GOOD). Please explain.
9. How do you rate existing incentives for retrofit (1 VERY POOR TO 5 VERY GOOD). Please explain.