centre for sustainable energy

COMMUNITY RETROFIT GUIDE

We're a charity supporting people and organisations across the UK to tackle the climate emergency and end the suffering caused by cold homes. We do this by sharing our knowledge, practical experience and policy insights.

For over 40 years, we've supported people to take effective action on energy in their homes. We help communities and local councils to understand energy issues, set priorities, and put plans into action. Our research and analysis focus on making the energy system greener, smarter and fairer.

Find out more at **www.cse.org.uk**

centre for sustainable energy

St James Court,
St James Parade,
Bristol BS1 3LH

0117 934 1400
www.cse.org.uk
info@cse.org.uk

@HelloCSE

Charity: 298740
Founded: 1979

Contents


Makita
18V
3.0Ah
LITHIUM-ION

1. Purpose of this guide

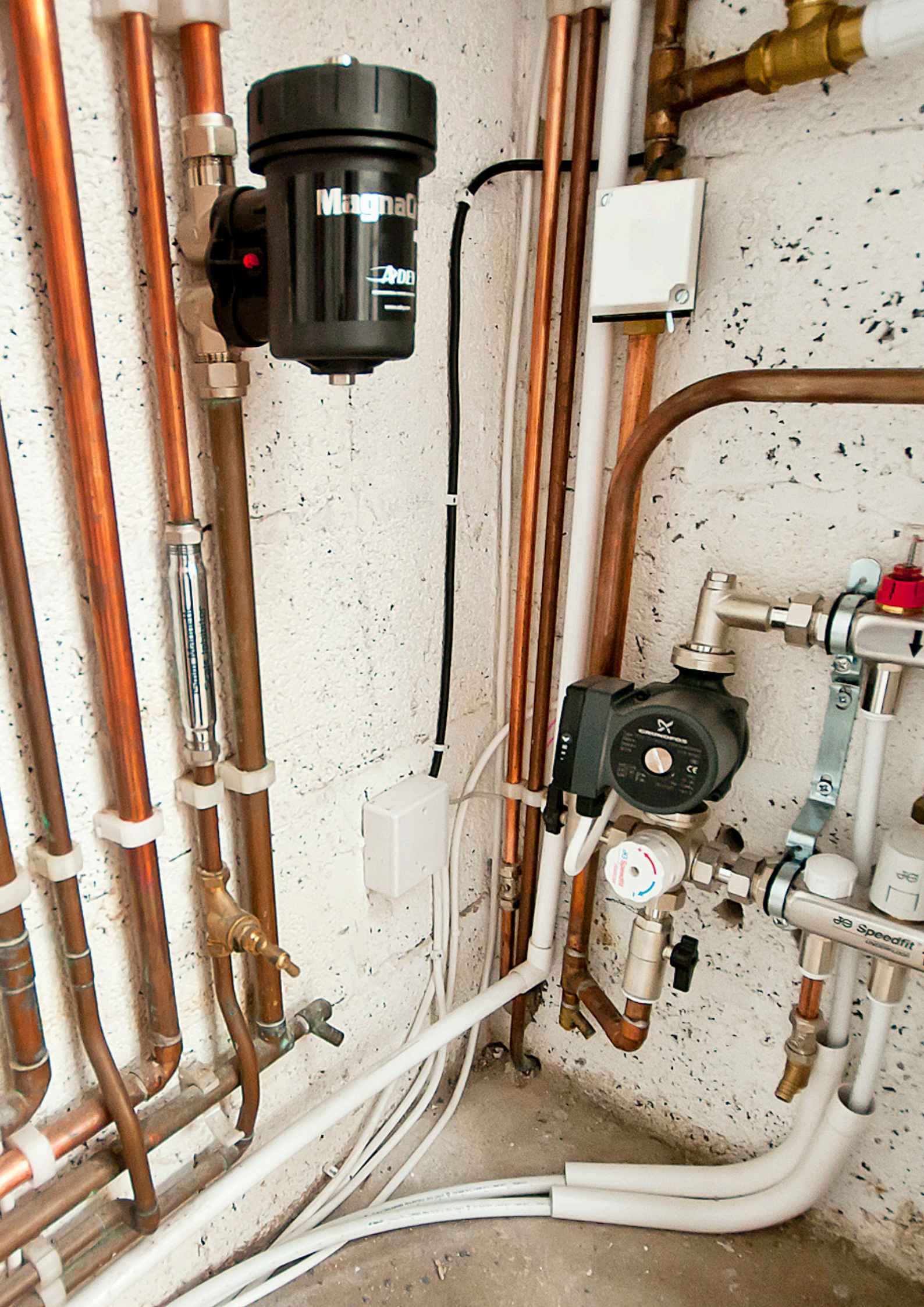
This guide is intended to be a resource for community groups who would like to become involved in domestic retrofit.

We will explore the many ways in which community groups could get involved in this exciting and rapidly growing area. This could be giving advice, carrying out assessments, or helping to develop local supply chains. We help you to think through the process of getting started.

The retrofit industry is currently in a period of both rapid change and growth. Recent changes to legislation including the introduction of PAS2035 have had a significant impact on the way that retrofit is delivered. The level of interest amongst householders is also growing, spurred on by recent energy price rises and a desire to safeguard against future increases. Carrying out retrofit is critical to meeting the UK's carbon reduction targets, and reducing carbon is also a driving factor for some householders.

The focus of this guide is on retrofit in a domestic setting. We are currently developing separate resources for community groups which look at retrofit of community buildings.

This guide has been created by the Centre for Sustainable Energy with input from Plymouth Energy Community (PEC) and Bristol Energy Network (BEN).


Speedfit

2. Retrofit basics

What do we mean by retrofit?

Retrofit is commonly defined as making changes to buildings in order to reduce energy use, carbon emissions, or both. It's estimated that **26m homes in the UK** will need to be retrofitted in order to meet our carbon emission reduction targets.

Retrofit can encompass a wide range of measures and interventions, ranging all the way from basic works such as draughtproofing and loft insulation to bigger projects like new windows, solid wall insulation, or low carbon heating systems. Consequently, some retrofit projects may involve only minor disruption to the householder and be straightforward to carry out, whereas others will involve a complete strip back and redesign of every aspect of a building including it's fabric, services, ventilation and water use.

Retrofit can sometimes result in opposing recommendations for change. The aim of reducing carbon emissions can be in conflict with a need to reduce fuel poverty, or to make the home more comfortable. For example, replacing a gas boiler with an air source heat pump may be the best measure in terms of reducing carbon emissions, but the heat pump may be more expensive to run than the existing gas boiler (at current energy prices).

It's therefore vital that retrofit is carried out in a considered and responsible way, taking into account the needs and priorities of the householder, as well as the needs of the property itself, the local and wider environment, and carefully considers what the purpose of the retrofit is.

In a recent survey of over 4,000 people across Devon **conducted by Plymouth City Council**, 59% of respondents did not know what retrofitting a home was and 82% said that access to reliable information about improvements was likely or very likely to influence them into upgrading their home. Despite the lack of awareness, the survey revealed substantial interest in energy efficiency with 64% of respondents reporting having talked with family about energy efficiency and 47% with friends. These survey responses demonstrate a fertile ground of people interested in making improvements but not feeling confident in doing so.

The holistic, whole house approach

For a long time, there has been a focus on single measures such as cavity wall and loft insulation, whether installed alone or in combination. Although this is sometimes perfectly acceptable, it can cause unintended consequences and this approach also creates an incentive to install measures even where inappropriate, for example, cavity wall insulation in a property which is exposed to wind and rain. Government funding schemes have been built around this type of approach, and unfortunately this is often still the case. This narrow approach to retrofit has led to numerous unintended consequences:

- Badly executed retrofit has led to damp and mould, compromised indoor air quality and affected human health.
- Damage has been caused to buildings and to heritage – where inappropriate materials have been used to insulate older buildings.
- The environmental impact of the retrofit work sometimes exceeds the reductions achieved in operation – causing the opposite result to what was intended. This can happen where the amount of carbon used to manufacture, transport and install a measure exceeds the savings from its use.

Within the retrofit industry, the best practice approach is holistic and whole house, meaning that retrofit should look at the property as a whole and create solutions which ensure that any measures being installed are appropriate, necessary, and don't produce unintended consequences. This is one of the focuses of PAS2035, which is described in more detail below.

The importance of repairs and maintenance

Although repairs and maintenance isn't as exciting as, for example, getting some solar panels, it's a vital first step on the road to retrofit and is often overlooked. Our homes are designed with systems in place to keep them dry, such as the ability of the external surface of the property to allow moisture to run off and away from the base of the wall, and the ventilation within the house that removes humid air and toxins to replace with fresh dry air. If elements of these systems are in a poor state of repair this increases the risk of damp, mould, rot and infestation. That risk can then be exacerbated if changes such as insulation or airtightness measures are introduced.

The introduction of insulation to a well-maintained building can also make it more susceptible to damage if there is a maintenance issue. Take a cavity wall that has developed a crack on the outer leaf. If the wall isn't insulated, then the water that is penetrating that crack will run through the cavity and out at the bottom. If blown fibre cavity wall insulation had been installed, then this water penetration will likely wet the insulation which will hold onto the moisture. This will conduct moisture to the inside wall causing damp, and will conduct much more heat than dry insulation, creating a cold bridge, also causing damp. In this case, insulation has compounded the maintenance problem.

There is a lack of knowledge about the importance of maintenance amongst the general public, especially in relation to older buildings. This is a key area that community groups could get involved in.

Risks of retrofit projects

The headline risk for any retrofit project is damp. Good retrofit should safeguard a property against damp, reducing the risk of this, however in many cases, retrofits have done the opposite. This is usually due to a combination of poor design, poor execution, poor maintenance or inappropriate materials. A common source of damp is condensation, which can be due to cold bridging (a gap

in or absence of insulation causing a cold spot for water to condense), poor ventilation strategy (a retrofit that reduces unwanted ventilation without introducing controlled ventilation can cause an increase in humidity) or interstitial condensation (condensation from warm air getting behind insulation and condensing in the fabric of the building). In other cases, retrofits can cause building faults or create weak points that are susceptible to failure in the future, resulting in moisture penetrating the walls or roof.

There are other (non-damp related) risks from retrofits including:

- Poor performance – a project does not achieve the improvement it set out to deliver.
- Damage to the visual appeal or character of a building – this is particularly acute for listed buildings or homes in a conservation area.
- Creation of an unwanted ongoing maintenance requirement.

There are several ways that community groups could help with the mitigation of risk around retrofit, which is explored in more detail in **Section 5**.

Regulations governing retrofit

In this section we will look at the main regulations associated with retrofit including:

- PAS2035/2030
- Minimum Energy Efficiency Standards (MEES)
- Building regulations
- Product standards

PAS2035 and PAS2030

PAS2035 sets out the process governing retrofit advice, assessment, design, coordination, evaluation and monitoring. It goes hand in hand with PAS2030, which is an accreditation for retrofit installers. The main focus of PAS2035 is on the management and mitigation of risk in retrofit projects. It is a major change in the way that retrofit schemes are delivered in the UK, and the industry is still in the process of adapting to this new way of working.

Any installer working on a PAS2035 scheme must have PAS2030 accreditation. The PAS2030 framework covers the specification and installation of energy efficiency measures. **Please refer to the appendix for more detail**.

When is compliance with PAS2035 required?

It has been a requirement since June 2021 that most government funding schemes must comply with PAS2035 (see appendix 3). Any other retrofit project is not required to comply, and in these contexts, PAS2035 can be seen as a best practice framework which can be used to help guide and inform decisions around retrofit.

Householders who are self-funded – i.e not eligible for government funding – are unlikely to choose to comply with the whole PAS2035 process. This is because compliance can be really complicated. There are requirements which can be hard, if not impossible, to meet. For example, if a property is having any fabric improvements made – even just loft insulation – then the ventilation will usually need to be upgraded too. This often means retrofitting trickle vents to windows (which may void warranties, or be undesirable from an aesthetic perspective), or installing core vents through walls, which is expensive, and unsightly. These issues are especially problematic for properties which are protected (meaning they are in conservation areas or are listed) as changes to the external appearance must be approved by the conservation officer.

PAS2035 is regularly reviewed and updated, so it may be that these requirements change in future editions of the standard, or that compliance is required in other situations to those outlined above. For example, it may become a requirement to access certain types of finance or mortgage products.

Minimum Energy Efficiency Standards (MEES)

Since 2018, landlords of privately rented dwellings have been required to ensure that the properties they let out meet a minimum standard of energy efficiency for both existing and new tenants. This is currently EPC band E. The government has stated that it aims to increase this minimum to EPC band C by 2030, 'where practical, cost-effective and affordable'. As this happens, landlords will have a need to understand the implications of this improvement for them and the support of informed advice will likely help them make better informed decisions that improve the experience of tenants in the long term.

There are some exceptions to the current requirements, for example, in the case of listed buildings or where the cost of making the required improvements is too great. Landlords need to register an exemption and provide evidence of the reasons they are requesting it.

Local authorities are required to take action to enforce these regulations, and can issue financial penalties for non-compliance.

Building regulations

Building regulations in the UK are statutory regulations governing certain building work. All newly built properties must meet the regulations, but in the context of retrofit, building regulations only apply when making 'material alterations' to a building. This means more than 50% of an individual thermal element

(I.e a wall, ceiling or floor), or more than 25% of the whole building is being renovated. This also includes alternations such as loft conversions, extensions, and window replacements.

Best practice retrofit should always seek to meet current building regulations as a minimum, and may in some cases exceed them. For example, a retrofit designer may choose to install more insulation than is required by building regulations in order to achieve a higher thermal performance of a building element.

There was a significant update to building regulations affecting retrofit including part L (Conservation of Fuel and Power) and part F (Ventilation) in June 2022. This means that any retrofit needing to comply with building regulations is now required to meet more stringent standards around thermal performance and ventilation provision. Another change is that all new central heating systems must be designed with a lower flow temperature in order to prepare for low flow temperature low carbon heating such as heat pumps.

Product standards

There are product standards in the UK which affect the energy efficiency of many products used in the home such as heating and ventilation systems, lighting, washing machines, and water heaters. These are continually updated based on government targets and improvements to product efficiencies.

Manufacturers are required to provide an energy label to provide information on the efficiency of their products. The **appliance label scheme** was rescaled in 2020 to allow for future improvements to the rating system.

Funding

There have been many government schemes offering grant funding over recent years, most of which have been short lived. The exception to this is the Energy Company Obligation (ECO), which has been running in various forms since 2013. The main grant schemes for energy efficiency are Home Upgrade Grants (HUG), ECO and the Boiler Upgrade Scheme (BUS). **Please see the appendix for details of each current scheme.** Generally speaking, most funding is focussed on those on the lowest incomes, and those with health problems.

The biggest schemes are ECO and HUG, which require PAS2035 compliance, and therefore have a focus on taking a whole house approach (in theory). Other schemes such as the BUS and Connected for Warmth are single measure schemes and do not require PAS2035 compliance.

What do we mean by 'self-funded'?

Those households who fall outside of the eligibility criteria for funding are referred to as 'self-funded'. Previously, the phrase 'able to pay' was sometimes used, but as many of these households are not, in fact, able to pay, but would struggle with the cost of retrofit, the use of self-funded is now used instead.

For some types of funding, householders are expected to make a contribution towards the cost of the install, whereas for others, they are not allowed to, so the line can sometimes be blurry. The main scheme this applies to is the BUS, where households will almost definitely need to make a significant contribution towards costs.

See Section 5 for more details on working with self-funded households.

Grant-funded vs self-funded

As described in later sections, the market, supply chain, and how projects are managed, is very different for funded schemes than it is for self funded projects. It's therefore important to be clear from the start on which group you want to engage with.

Community groups are often keen to work with people who are in fuel poverty within their communities, however, the requirements for working on funded schemes can be onerous and difficult to achieve for small or voluntary organisations.

On the other hand, self funded customers will expect a certain level of knowledge and expertise which can be challenging for community groups to provide.

There is more detail in the following sections on the roles community groups could play within these groups and questions to consider when deciding how to set up a retrofit project.

3. What roles could community groups play in delivering retrofit?

This section provides an overview of the options for community groups and key questions when scoping an offer. For more in-depth information about delivery of grant funded retrofit support see section 4, for in-depth information about self-funded retrofit see section 5 and for more information about income models for retrofit delivery, see the included document that addresses this directly.

The case for community group involvement in retrofit

The '**Each Home Counts**' review recognised the importance of putting the householder at the heart of efforts to improve the energy efficiency of our homes and highlighted that building their trust would be vital in improving uptake.

Whilst it is widely understood that impartial advice and engagement will play a central role in overcoming the barriers to a well-functioning market for retrofit, this still isn't central to the way measures are delivered and independent advice often isn't part of the customer journey. If we are to drive the uptake of measures at a faster rate than will be achieved by market forces alone, there needs to be more innovation around impartial advice and the services needed to support people to take action. Trusted local intermediaries can play a highly important role in enabling greater uptake and supporting better outcomes.

Engagement, education and demand building

The **survey results from Devon (PDF)** referred to in section 2 demonstrate a fertile ground of people interested in making improvements but not feeling confident with doing so. Community groups can play a key role in supporting these households into being aware of retrofit and wanting to embark on retrofitting their home. This can be served by local engagement activities that build awareness, trust and a sense that retrofit is part of a social norm.

Specifically with regards to trust, community groups can support households by messaging that retrofit can have real and considerable benefit to them and there are good local installers, retrofit coordinators or a more formal independent service available to offer advice and support so that they can be confident they are making good decisions. This education-based engagement approach is deliverable at any scale, by volunteer groups or established organisations and builds a vital bedrock of knowledge and positive feeling that will support any self-funded or grant led services. It is also very likely to be trusted if it comes from recognised, locally based groups.

Grant funded projects

It's important to note that grant funded work will sometimes require people to have formal qualifications and insurance.

This is brief overview of the roles community groups might play in grant funded projects:

- **Lead generation** - local authorities and others delivering grant funded projects need to generate interest, or leads, for funding and community groups are ideally placed to help with this.
- **Retrofit advisor** – this work is not directly funded in grant funded projects but there are substantial eligibility checking requirements and good advice can avoid expensive, late-stage dropout of clients so a case can be made for funding it.
- **Retrofit assessor** – community groups might employ or partner with a local assessor to complete assessments in order to pass assessed, eligibility checked customers to the installer.
- **Retrofit coordinator** – community groups could work with in-house or third-party retrofit coordinators to oversee all works. This would be hard to implement in some grant funded models (i.e. ECO)
- Some community groups will be large and well funded enough to employ assessors and coordinators, but also need a connection to a regular stream of PAS2035 work (see Section 4).

Self-funded retrofit

This is a brief overview of the roles community groups can play in self funded retrofit:

- **Household engagement** – initial engagement with local communities on retrofit promotion and advocacy can be effectively done by a wide range of community groups, not just 'energy' focussed ones.
- **Retrofit advice** – community groups are ideally positioned to provide householders with unbiased, practical support and advice. This can be fairly general, or specific to individual properties.
- **Retrofit services** – Community groups could partner with local freelance retrofit coordinators (or for very established groups employ them) to offer services that cover each stage of the customer journey, from assessing the property and specifying works to overseeing the day-to-day installation with site visits. These services can combine the efforts of advisors, assessors, and coordinators.

- **Supply chain engagement** - contacting local businesses and organisations to encourage collaborative working on retrofit.

Questions to consider

What are the capabilities of your group? What other support exists locally? Who could you work with?

The first thing to understand is your level of ambition and the people and resources that are available to support this. It may be that there is one group member whose dream is to run a retrofit project, but there aren't the other necessary components to make a functioning service.

If there are a core group of people who are keen to work on the project, then think about whether you have the mix of skills needed to fulfil the key roles needed. For example, do you have a fundraiser to write a funding proposal, a project manager to coordinate the work, a marketeer to find interested households and a retrofit advisor or assessor to do the delivery? This is not an exhaustive list and it's important to add that other partners or local organisations could supply some of these roles. The next key step is to look at what other organisations exist locally and whether you can work with them.

What resources are available? Do you already have a funding stream to use, or do you need to bid for funding?

You will need to understand what the funding landscape looks like and how you can access funding. In the long term, partnerships with local authorities, installers or a trading business model that allow for long term, sustainable delivery are likely to be the best option. However, any group setting out with this goal will have to undergo years of development and establishing services to get there. This means writing a bid will be essential which is often a different skill set to delivering the project. If you win funding, you'll need to consider how you will staff the project. Can you do this with time from existing members or do you need to recruit? If you are recruiting, what are financial implications for the group? What are the risks and liabilities associated with paid members of staff?

What's the business model? Are you expanding an existing service or setting up a new organisation?

The answer to this is likely to come down to an analysis of risk, the purpose of the existing organisation and any key restrictions the organisation has that may block the retrofit services delivery model. If moving into retrofit support will expose the existing organisation to substantial risk then you may want to create a dedicated organisation for this activity. This is unlikely to be the case for simple engagement and advice-based models, but more complex retrofit coordination support may be different. Also, if the existing organisation is likely to be heavily constrained, for example a parish council or a charity with a substantively different charitable purpose, this will be a

constant, restricting influence on this new area of work.

See Appendix 1 for more information about identifying income sources and this resource from Cooperatives UK on financing the formation of your co-op.

If you are an unconstituted or new group, what's the best corporate form for a retrofit advice service e.g. charity, CIC, cooperative, community benefit society?

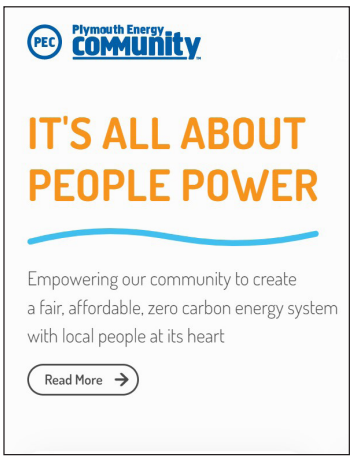
It is relatively easy to incorporate a private company, however if you are looking to establish a level of trust in your community, establishing as a not for profit and community owned or led organisation may be beneficial. There is further advice about the different legal structures provided by Cooperatives UK here. Making the correct decision is important as it may have implications for the ability to raise community shares, the governance requirements, the tax implications and more.

What's your brand? Will you be delivering as part of a consortium or wider cooperative?

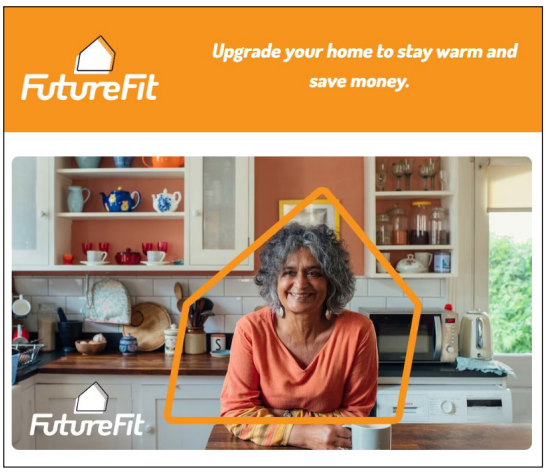
How does your group establish a local brand? Does this need a new identity or to use the existing identity?

You will need to make an analysis of any existing brand and how well it translates into retrofit offers. How much do people relate to the existing organisation and what do they think that organisation does or is there for? If your organisation is not operating in an environmental or consumer advice area, then adding these services under your existing banner and brand may be more confusing than establishing a new brand.

Plymouth Energy Community tackled these questions in 2022 as they began delivery of their Sustainable Warmth Fund. They found that their existing brand was inappropriate as it was insufficiency eye catching for a heavily promoted consumer offer, and not clear enough about what was being offered. They therefore established Futurefit, and examples of its branding compared to PEC's can be seen below:



Left, the home page of PEC's website. Note the contrast with (right) the webpage about Futurefit.



Are your members employed, self-employed, volunteers?

There are great examples of retrofit projects working with all three member types. Teign Energy Communities are demonstrating how a group of, largely, volunteers can deliver useful, technical support for households in retrofitting their home. Many community groups operate with self-employed staff and to offer a comprehensive, sustainable long-term service, aiming for employed staff is going to be essential.

Can your organisation reliably deliver the service you are seeking to deliver with the current group of members, staff or volunteers? If you need to employ or contract with more people, how will this be properly managed and how will people be inducted? Is the offer for employees or self-employed people good enough to avoid high turnover of staff and contractors, and to get the right candidates? How does building the number of people working on a project build the organisation – do you need to work out a plan for charging overheads?

To build a service do you want to start with self-funded or grant-funded (PAS 2035) activity?

It is worth considering which sector you want to focus on initially. It may make sense to focus on either self-funded or grant-funded retrofit at the start of your retrofit service, rather than both, as they each have their own considerations and requirements, as discussed above. This may be a question that is as much about the stakeholders in the project and support you can mobilise. For example, it might be contingent upon whether the local authority is happy to include you and pay you in their local delivery programmes.

You could then look at providing services for the other sector later on, but aiming to start offering services to both is likely to be too challenging.

Please refer to the information in Section 4 (Delivering grant funded retrofit) and Section 5 (Delivering self-funded retrofit) for details of the requirements, costs and so on for these sectors.

What are the risks for an organisation engaging in the retrofit market?

One of the major risks is the potential for legal action where people feel they were poorly served in a manner that resulted in damage to their home. Where engagement and advice are involved and the focus of advice is to discuss possibilities, highlight considerations and support people to identify next steps, these risks are fairly limited and most organisations operate with some professional indemnity insurance covering this risk.

However, as retrofit coordination or project management become involved the risks escalate significantly. Specific retrofit coordinator insurance is needed, and the retrofit coordinator needs to be confident that required processes and best practice is followed in full.

This area is also fraught with risk to your organisation's reputation. This can come from:

- Slow or messy project delivery
- Poor installations or poor handover information
- Installers going into liquidation or operating with poor customer service.

Community groups should be highly wary of recommending installers. Language such as 'we are aware of x installer that can offer that support' is better, but even then, the advisor needs to be aware that the householder will take that as an implied recommendation, so any mention of an installer has a risk of blowback. This must be considered alongside the fact that one of the most helpful things customers can receive is help to find trustworthy installers. Enclosed with the resources in this guide is PEC's partnership agreement with installers and installers Expression of Interest (EOI) for partnering (**download this as a spreadsheet**). This sort of structure can be used to give more confidence in introducing installers to customers.

What's your business model? How do you plan to generate funding or income for your retrofit service?

Securing funding for the provision of grant-funded retrofit services is likely to require discussions with other organisations in advance of funding opportunities becoming available to ensure the work will be funded. Any funded retrofit advice or services for this sector will need to be linked to a specific scheme. For example, most HUG schemes have been led by local authorities who have bid for, and won, funding from central government. ECO is funded differently — certain installers can access ECO funding for measures installed according to the requirements of the scheme. Such installers may be open to, for example, paying a referral fee for clients that are ECO eligible and require measures they offer, but there are a range of issues to be considered in this type of relationship not least the protection of vulnerable clients' personal data.

The self-funded sector is different in that currently retrofit services do not have to be linked to a particular scheme or schemes. However, in the future there may be requirements for retrofit services for self-funded households to meet quality assurance standards. Retrofit services for this sector can be sold directly to householders who are willing to pay for them to progress retrofitting their homes. But again, a number of issues will need to be carefully considered.

The aim of the service, and the linked retrofit roles will significantly affect the costs the proposed service will incur, as well as income and risks. The relevant sections for grant funded and able to pay services have more information.

See **Appendix 3 (Current funding schemes)** for examples of several different projects which have utilised community groups in different ways on retrofit projects.


TROTT

4. Delivering grant-funded (PAS2035) retrofit

This section assumes that PAS2035 compliance is a requirement for grant funded retrofit (which isn't always the case). See **this section** for more details on the current grant funded schemes.

Community groups can potentially get involved in these types of projects, although the training and accreditation requirements may be too difficult to achieve for some roles.

What are the roles within PAS2035?

The **retrofit advisor** role is a customer facing role, aiming to give householders independent advice about the retrofit options for them and their home, often at the start of the process but also throughout a project. They can also have a role in the administrative process. Until recently there was no specific training for this role, but Retrofit Academy have now created a level 3 course for retrofit advisors (**see training and accreditation spreadsheet**).

- This role could be perfect for community groups who want to promote retrofit understanding and uptake in their area without getting involved in carrying out the work and the associated risks of doing this.

The role of the **retrofit assessor** is to visit the property and carry out a comprehensive survey which includes a condition report and assessment of the ventilation along with the construction and building services. This report is then passed to the retrofit coordinator.

- This role is suited to those with a background in assessing buildings and those who are looking to do retrofit assessments as a career. It's unlikely that someone would want to do this role on a volunteer basis.
- To work on PAS2035 compliant schemes, there are training, CPD, software fees and equipment requirements which may make this unsuitable for some community groups. Note that there is a requirement to become qualified as a Domestic Energy Assessor before doing the retrofit assessor training.

The **retrofit coordinator** role is to ensure that all the elements of a retrofit project are properly managed and coordinated, and that a cohesive retrofit plan is designed and implemented.

- This role requires costly training and CPD requirements and is well suited to those with a background in managing construction projects.
- A major aspect of the role in the context of PAS2035 is to ensure that projects

are compliant with the relevant regulations.

- Outside of PAS2035 compliant projects, a role like a retrofit coordinator could be called a project manager. This is sometimes done by someone working for the contractor, but there is an appetite amongst householders for independent project management support with retrofit projects.

The **retrofit designer** is someone who is qualified to create designs for the measure, or groups of measures, which are being implemented. This requires specialist knowledge and is therefore unlikely to be undertaken by a community group. This may be someone working for the contractor, or may be an independent design expert.

Similarly, the **retrofit installer** is the person or company who actually installs the measure(s) and therefore we assume would not be undertaken by a community group.

The **retrofit evaluator** is the person who carries out monitoring and evaluation after the retrofit has taken place. At present, this is a somewhat underdeveloped role and evaluation is usually carried out by the retrofit coordinator.

- However, as this role develops there could be an opportunity for community energy groups to conduct independent and unbiased evaluations of retrofit work which could be beneficial to avoid 'marking your own homework'.
- There is also a need for evaluation of retrofit work outside of the PAS2035 framework. See Section 5 for more on this.

Lead generation, processing applications and eligibility checks

An additional, but important, part of the process for grant funded projects is to generate interest amongst the public, and pass customer details (or 'leads') on. There are minimal training, software and equipment requirements for this type of activity and it's well suited to part time volunteers. This makes good use of the trusted position community groups already have in the community, and encourages householders to engage with retrofit who may normally be hard to reach.

You could also assist with gathering customer data for the grant application and making eligibility checks, which are needed in order to establish whether a customer can get the funding. This could be gathering documents like bank statements and benefit award letters. You would need to have the required data protection processes in place in order to process sensitive customer data – see below for more on this.

However, the nature of current government funding schemes means that the combination of eligibility criteria, delivery restrictions and restrictions placed by PAS2035 mean that it is sometimes not possible to identify who may benefit from the scheme at the first conversation. This can may result in frustration from the householder and a potential risk of that being directed at you, as the intermediary, if work is not able to go ahead.

It's important to be aware that working with householders who are eligible for funding will

require skills and knowledge around working with vulnerable adults, as they may sometimes be vulnerable due to ill health or age. This may mean that householders need additional support and consideration to take account of their needs.

How does the funding work?

Home Upgrade Grant (HUG)

Local authority budgets are split into capital and administrative expenditure. Capital funding must be spent on the installation of measures in properties. Administrative funding is there for managing and administering the scheme. Administrative costs cannot exceed 15% of capital costs. However, some administrative costs can be 'capitalised' where they directly relate to installation of a measure. So, for example, retrofit assessments and retrofit coordination costs associated with a property that receives installs can be charged against the capital budget. Third parties can also make a similar 'capital charge' for administration of grant applications. Community groups can provide services that would be funded by these administrative pots, or the capitalised services listed above.

There are many opportunities for community groups to assist local authority delivery of retrofit that are mutually beneficial and provide a better service to customers. However, the risks arising from the central Government approach of setting layers of detailed and complex rules to control expenditure, compounded by short timescales, mean that there are risks in these project that are hard to manage. The standard local authority model is to have a delivery partner absorb many of the risks.

To realise an effective partnership with community groups to support these projects, local authorities need to adopt a more collaborative approach to how their delivery partners are procured. They need to be able to break down roles in the project and accept that the level of risk may need to look different for the responsibilities being given to large private sector companies from the responsibilities community groups may be taking on. In turn, community groups will need to seek to understand and manage these wider risks as far as they are able to and clearly articulate the added value they will deliver.

Social Housing Decarbonisation Fund (SHDF)

SHDF projects face many of the same restrictions as local authority led private housing retrofit schemes. However, there are key advantages, including that housing associations will know the stock that is facing improvement and there are less eligibility hurdles to clear.

To our knowledge, there are no community groups working with housing associations to deliver the SHDF and this may be due to a much lower customer handling requirement – for example, there are no eligibility documents needed and no real element of customer choice. This means housing associations' existing resident liaison teams are sufficient to meet the needs of the scheme. However, with a substantial increase in funding under SHDF Phase 2, this may become more acute

and community groups with experience engaging with and supporting households living in social housing may play a role in assisting delivery.

ECO

ECO schemes have a complex, multi-level contracting approach. The customer focussed end of this chain though is the installer. When delivering schemes, the installers need to balance an extensive list of regulation and compliance standards. ECO contracts typically pay based on outcomes, fee per pound of lifetime fuel bill savings for example. This leads to a situation where some homes that are expensive to deliver and do not provide high outcomes may be loss making, whereas others that are cheaper to deliver and provide high outcomes may provide profits that are several times the cost of delivery. For installers, managing this risk is key and successful installers in this space are experts at funnelling the right properties to install and avoiding exposure on the wrong properties. Whilst there are concerns for how this mechanism plays out in terms of customer experience, fairness and efficiency, in terms of the administrative costs, this mechanism does focus deliveries on the outcomes selected.

Installers have often looked to pay others to complete the work that isn't in their core offering. Lead generation companies have thrived on handing over interested eligible customers and third-party surveyors. Retrofit advisors and retrofit coordinators are also reasonably commonplace. There are opportunities for community groups in delivering these services for a commercial price. This approach may be particularly needed where an installer is based a long way away and lacks the local infrastructure for surveying, and would be paying substantial time and mileage on sending a surveyor.

The present round of ECO funding involves a substantially more complex mechanism for calculating the grant available, such that it is impossible for an installer to know how much is on offer until the home has been assessed and a set of measures is proposed. With the introduction of PAS2035, it is also impossible to know the viability of a measure until the house is technically surveyed and given to a retrofit coordinator to review. Where installers are 'taking a punt' on a home, one has reported a 95% failure rate (only 5% of surveyed homes have a viable case to be improved). It is clearly not viable to invest the better part of a thousand pounds on 100 homes and only get 5 viable jobs and this is reflected in a recent steep drop of install rates under ECO.

While this should give community groups pause for thought when considering a business model based on ECO services, it also provides an opportunity. For installers, the cost of surveying that home is very high, however for community groups working within a locality, a short, minimally technical survey is substantially cheaper and easier to deliver. This process could be a mechanism to produce leads for installers that have a substantially higher success rate.

What can you expect to earn?

What you expect to earn depends to some extent on the specific scheme and contract in question. For example, a tender process may define this and you have to work out whether it is viable to bid to deliver the work within the defined prices; in other circumstances there may be more freedom to set prices. In other cases there may be some negotiation to finalise prices. Ultimately, though, all this is influenced by market prices for the services provided by the roles defined under PAS2035.

Some roles and services can command higher prices than others, although it's also important to consider the costs of delivering each is properly covered (see the table below). For example, typically the price of retrofit coordination work per property is higher than a retrofit assessment per property.

There are a number of cost pressures for not-for-profit organisations wishing to offer grant-funded retrofit services, including:

- Organisations are facing higher costs due to much increased energy and other costs
- Greater competition from new market entrants, mainly commercial providers, who are able to offer lower fees (as has happened in the Energy Performance Certificate market)
- Some commercial providers are offering services that they claim are fully PAS2035-compliant at very low prices as a loss-leader. For example, some installers offer incredibly cheap retrofit assessments to enable them to access more significant grant funding available for installed measures. This artificially depresses the market price in the view of some funding organisations.

The cost implications

There are specific training requirements to enable someone to work as a retrofit advisor, assessor or coordinator on a PAS2035 compliant scheme. Assessors and coordinators also need to become accredited (I.e a registered member of an accreditation body), which entails an annual fee and Continuing Professional Development (CPD) costs. Accreditation provides access to software and technical support, and also requires that work is subject to an auditing regime.

This document (**click to download spreadsheet**) sets out a list of the current training and accreditation providers and costs. The table below provides a summary of the key initial and ongoing annual costs for each of these roles.

Other costs to bear in mind include project management and admin staff time; postage, printing and office-related costs; scheme provider and Trustmark lodgement fees, and travel expenses and time.

Role	Item	Approximate cost - initial	Approximate cost – ongoing (annual)
Retrofit advisor	Initial training costs	£600 - £1,300	–
Retrofit assessor	Initial training cost	£1,400	–
	Annual accreditation fees with scheme provider	–	£200
	Continuing Professional Development costs – course fees and staff time	–	Course fees approx £125 per year. 20 hours per year @£15 p/h = £300 Total £425
	Equipment (e.g.) iPad, ladder, laser tape measure, mobile phone	£1,000	£50
	Mobile phone or tablet tariff costs	–	£129
	Lone worker app fee (i.e PeopleSafe)	–	£500
	TOTAL	**£2,400**	**£1,344**
Retrofit coordinator	Initial training cost (see separate document for these)	£2,200	–
	Annual accreditation fees with scheme provider and Trustmark (see separate document for these)	–	£300
	Insurance fees (see below for more detail)	–	£1,700
	Continuing Professional Development costs – course fees and time	–	Course fees approx £125 per year. 25 hours per year @£20 p/h = £500. Total £625
	Lone worker app fee (i.e PeopleSafe)	–	£500
	TOTAL	**£2,200**	**£3,065**
Retrofit evaluator	Initial training cost – at present, the requirement is to be trained as a retrofit coordinator (see here).	£2,200	£3,065
Other costs to bear in mind	Project management and admin staff time. Postage and printing. Scheme provider and Trustmark lodgement fees (see here). Travel expenses and time.		

Software and modelling options for assessors and coordinators

Retrofit assessments

PAS2035 recommends using full SAP to create retrofit assessments. However, the main providers of PAS2035 compliant software use RdSAP with some additional elements added such as window orientations and dimensions. This being the case, assessors are still limited by RdSAP conventions, meaning, for example, that default u-values can only be changed where there is proof. This can mean that retrofit assessments suffer from some of the same inaccuracies and misleading assumptions that EPCs do.

Software is usually provided as part of the accreditation for retrofit assessors, often with an option to use an app out on site or a web-based version. This enables the assessor to input the data in order to create a retrofit assessment. A retrofit assessment is comprised of four main parts:

1. RdSAP, SAP or PHPP based assessment.
2. A condition report – a detailed survey of the condition of the property.
3. An occupancy assessment – information on who is living at the property, how they use their heating and any vulnerabilities.
4. A ventilation survey – a room by room report on ventilation provision and whether this can be considered adequate.

There is a fee to lodge the assessment, and they are subject to an auditing regime where the accuracy is checked by an auditor employed by the accreditation body.

Please note that what is outlined above is the usual way that retrofit assessments are carried out using the most common assessment software and methods. There may be other ways to carry out retrofit assessments which are compliant with the requirements of PAS2035.

Retrofit coordination

The situation with regards to retrofit coordination software is less straightforward. There are several different ways that coordinators may choose to access the software they need. The three main elements with regards to software requirements are:

1. Creating the improvement option evaluation (IOE).
2. A workflow platform.
3. The lodgement process.

1. Improvement option evaluation (IOE)

The retrofit coordinator is required to produce an IOE for each property. This is a document which sets out the installation cost, fuel savings, repayment period and carbon cost effectiveness. It could also include the impact on the SAP rating. The information used as an input for these calculations comes from the RdSAP/SAP/PHPP assessment of the property given to the coordinator by the assessor. The coordinator will also look at the other elements of the retrofit assessment – the condition report, occupancy assessment and ventilation survey – to make a decision about which measures are appropriate for the individual property.

At present, it's usually the case that the software provided for the purpose of creating the IOE by the retrofit coordination scheme provider can only work with inputs from their own assessment software. Essentially, this means that the assessor and coordinator need to be accredited with the same organisation.

However, there are some other options available such as a tool produced by the Retrofit Academy which can use data from any assessment software.

Some of this software is easier to use than others. The right option for each retrofit coordinator will depend on a number of factors including their own knowledge and experience of using energy assessment tools, as well as what is being used by others involved in the project.

2. Workflow platform

A workflow platform is a way for managing the installation process from start to finish, facilitating communication between the coordinator, project manager and installer(s).

Some retrofit coordination scheme providers offer access to workflow platforms as part of the accreditation fee. Alternatively, some coordinators may choose to use tools like Excel and email, or online filesharing sites, to pass information back and forth between the coordinator and installer. There is not a 'standard' way this is done across the industry, so for each project, it's important to establish what tools are going to be used at the start. Some installers will only want to use specific platforms, or may not want to use any – they may just want to have a weekly catch up in person. The coordinator may need to adjust to unfamiliar tools and processes for different projects.

3. The lodgement process

Retrofit coordinators must lodge the work carried out at a property with Trustmark. This may be achieved via software provided by the scheme provider, or directly on the Trustmark website.

The requirements for Trustmark lodgements are complex and detailed. They are also subject to an auditing regime by Trustmark.

Insurance and other legal considerations

If staff delivering retrofit roles are employees, then any cover under an organisation-wide combined policy will pick up their liability while they are carrying out their work. If they are sub-contractors, then they will need their own liability insurance in place. Depending on the situation and who was at fault would determine whose insurance would foot the bill.

An organisation's public liability Insurance covers the organisation against any third-party damage or injury while employees are carrying out their work. Employers liability insurance covers the company against any workplace illness or injury caused to employees. Professional indemnity insurance covers the company against any advice from the organisation that may lead to a third-party financial loss (if the organisation is deemed negligent).

Retrofit advisors do not require specific insurance, but anyone employing a retrofit advisor should ensure that there is an insurance policy in place for the organisation which covers advice provision. We would strongly recommend that this is confirmed with your insurance provider.

Retrofit assessors can usually access insurance via their accreditation body, which typically offer 'pay per click' insurance to cover the creation of the retrofit assessment, including Public Liability and Professional Indemnity Insurance. However, this does not cover any further verbal or non verbal advice. If the assessor is also giving advice to householders then their employer would need to ensure that they are covered by their own organisation's insurance, or the assessor may be able to access enhanced insurance for themselves via their accreditation body.

Insurance for **retrofit coordinators** needs to be acquired separately. Based on CSE's experience, the retrofit co-ordinator role is likely to fall outside of the scope of a community or advice organisation's insurance. There are specialised insurance products on the market for retrofit coordinators.

Anyone visiting people at home or spending time with people on a one-to-one basis is likely to need an **enhanced DBS check**, so you need to allow budget to cover this.

Customer relationship management software

If you are recording and managing people's personal data, you will need to have some kind of software to enable you to do this which is more sophisticated than an excel spreadsheet. However, commissioning new IT systems can be very time consuming and costly. The workflow platforms described above may help with some aspects of these requirements, but you're likely to also need additional ways of storing data. Unfortunately, at present there isn't an off the shelf product that is widely used, but this may change in future.

You will also need to have **Information Commissioner's Office registration** and build in processes around **General Data Protection Regulations** (GDPR) to ensure compliance.

Working with installers

Installers that work on grant funded schemes such as HUG and ECO tend to be larger companies that monitor the requirements of these schemes and are able to meet them. Meeting certain standards comes with the territory for these installers as they have had to do this over a significant period to deliver measures under the long running ECO scheme. As mentioned in the **funding section**, in order to access grant funding and deliver measures under these schemes, installers must be Trustmark approved and have **PAS 2030 accreditation** or the renewables-focused **Microgeneration Certification Scheme** (MCS) accreditation, depending on the measures they install.

Installers working on grant-funded schemes have tended to install a small number of measures in large quantities, over a large geographical area and according to a set procedure (such as loft insulation or cavity wall insulation). However, this is changing with PAS 2035 and the requirement to meet its principles including whole house retrofit. Many of the installers working on grant-funded schemes are increasing the range of measures they can offer, either in house or through sub-contracting to installer partners. However, they are still looking at delivering measures on a large scale to make the finances work for them due to the high cost of meeting scheme requirements and other overheads.

Retrofit installers often employ (or train existing staff to become) retrofit assessors and coordinators. This is currently allowed under PAS2035, although it is somewhat controversial. They can therefore be reluctant to work with assessors and coordinators who are outside their own organisation.

Another key part of the process is the role of the retrofit designer. Again, this role can be filled by someone who works for the installer or is independent. Communication between the retrofit coordinator, designer and installer can be challenging at times.

See the **case studies in the appendix** from CSE and PEC's work on local authority funded projects.

5. Delivering self-funded retrofit

Self-funded retrofit is defined as retrofit which is not being funded via a government funding scheme, although there may sometimes be overlap, such as in the case of the Boiler Upgrade Scheme.

Understand householders' motivations

Market segmentation is important when thinking about working with self funded householders, as this will include a wide range of different people, with differing amounts of capital available to them, as well as levels of interest, enthusiasm, and knowledge. Some households may have a large amount of capital available and are driven by a focus on saving carbon, whereas others will have minimal savings and will be focussed more on how they can save money on their energy bills.

Evidence demonstrates that there is a group of homeowners ready to invest in improving their homes who will value independent, impartial and high-quality support to do this. Market research of over 4,000 households in Devon completed by Plymouth City Council indicates there is 12% of the population seriously considering retrofitting their home. The key trigger points that would encourage them to act are:

- Availability of finance.
- Being more environmentally friendly.
- Access to reliable builders.
- Access to reliable information.

This research seems to be supported by the experience of organisations such as Carbon Coop and Retrofitworks who have established effective, long term delivery of advice and support to these customers.

It's important to understand people's resources and motivations as this will have an impact on how you engage with them. Accessing area specific data such as indices of deprivation and EPC data can be helpful when thinking about how to approach different types of households in your area.

Some academic research has been carried out in this area which may be useful to review. Examples include:

Consumer insight: Understanding how to motivate whole-house retrofit.

An innovative retrofit Motivation-Objective-Criteria (MOC) approach integrating homeowners' engagement to unlocking low-energy retrofit in residential buildings.

Identifying owner-occupiers' motivations to undertake energy-efficient housing retrofit.

Household engagement

Initial engagement with local communities on retrofit promotion and advocacy can be effectively done by a wide range of community groups, not just 'energy' focussed ones. There are minimal training, software and equipment requirements for this activity and it's well suited to part-time volunteers. This makes good use of the trusted position community groups already have in the community, and encourages householders who may normally be hard to reach to engage with retrofit.

You may already have a good idea of who you want to engage with retrofit advice, whether that's based on geographical area, householder demographic, or to achieve a specific outcome. If not, there are tools available to help you target advice where it's most needed. A good place to start is with your local authority. They may hold data on properties in your area that could be useful. For example, they may have data on EPCs or areas of deprivation

Parity Projects' Pathways tool is used by many local authorities across the UK to profile their housing stock and design retrofit schemes. They may allow you to use some of this data in order to work out a strategy for targeting your advice.

The Centre for Sustainable Energy has lots of materials for community groups wishing to undertake retrofit and other sustainable energy projects. See www.cse.org.uk/community-retrofit or email communities@cse.org.uk.

Retrofit advice

Community groups are ideally positioned to provide householders with unbiased, practical support and advice. This can be fairly general, or specific to individual properties. However, it's important that whoever is giving the advice is knowledgeable and has completed relevant training.

There is now both a level 2 and level 3 training course available on giving retrofit advice. More details available on this downloadable spreadsheet.

General advice

The context in which community groups provide general advice to householders will, of course, vary depending on your group's individual circumstances and opportunities to engage with householders. This could take place in the contexts outlined above such as a stall at a public event or energy café, or a specific retrofit focussed event. You may also choose to engage with householders on a one to one basis where, for example, you visit them at home.

There are a few things to consider to make the first conversation you have with someone about retrofit an engaging and useful one. The following questions are intended as a prompt to encourage the householder to think about the answers for themselves – you won't always be able to provide an answer, and in some cases it would be inadvisable to attempt to do so.

- How do they find their house? Is it warm? Is it draughty?
- What is their property type and location? What is the heritage, is it protected, is it rural or urban, detached or terraced, etc?
- Who lives in the property? Number of occupants, pets, how long are they planning to stay?
- What are they hoping to achieve through retrofit – what are their priorities? Do they want to: Reduce bills? Reduce environmental impact? Improve air quality or comfort? Modernise the home? Tackle damp and condensation or specific problem areas?

  Each of these may result in different strategies or solutions for their property.
- Do they have a budget in mind? Do they have savings they could invest on projects with a reasonable payback period (e.g. solar pv)? Might they have access to funding soon, for example, a lump sum payment upon retirement?
- What works would they consider – have they given any thought to this? What is their tolerable level of disruption and aesthetic change, constraints on timescale, ability to install measures themselves?
- Might they be eligible for any grant funded energy efficiency works? See here for more on grant funding.
- Are there any structural issues, damp or mould, or other repair works needed such as leaks, woodwork, guttering repairs?
- Is there effective ventilation? This may need to be upgraded if the insulation or airtightness is being improved.
- What sort of heating do they have and how old is it – when will it be due for replacement?
- Do they already have any renewable technologies? How would any new measures work with this?

Repairs, maintenance and DIY

Community groups can help householders to understand the importance of looking at the condition of the whole building and how to repair, maintain, and operate it effectively. This should always be the first step when thinking about retrofitting a building.

This could be on specific topics such as how to deal with damp and moisture, how to care for and

repair timber windows, or what materials are appropriate to use in older buildings. It could also cover how to think about risk in retrofit, including how to find a reputable installer, highlight some of the dangers of inappropriate measures, poor installation, and not thinking about ventilation as part of the work.

Workshops are a good way to engage householders in these topics and can be a good springboard for them to start the process of thinking about retrofit. Advice could also include other related energy efficiency topics such as using heating controls efficiently, draughtproofing or appliance maintenance. **Warm Up Skill Up** is an example of this approach – **see appendix for more on this**.

Quality control, monitoring and evaluation

There is a need for post install quality control for retrofit works. This is important for self funded customers as there is no requirement for a retrofit coordinator to confirm that the work has been completed properly, unlike with a PAS2035 compliant project.

Depending on the level of knowledge and expertise, community groups could have a role in assessing if measures have been installed correctly – for example, loft insulation, or new windows, which are often poorly fitted. This could be a visual inspection or with the use of a thermal imaging camera. This can help reassure householders that work has been carried out correctly and their property, and for others to have confidence in the work of a particular contractor.

This approach has also been tested by the **Warm Up Skill Up** project in Bristol.

Giving detailed advice to individual householders

It's important to make sure that people giving this type of advice are sufficiently knowledgeable and that this is based upon experience or study of some kind, encompassing a wider range of topics than would have been possible via something like a self build or retrofit project. There is sometimes a temptation for people to think that having carried out their own project gives them sufficient knowledge to be able to advise others. Whilst this type of knowledge is valuable, it should be recognised that this alone does not give enough of a basis on which to be able to give detailed advice to others.

A recent degree in a building related discipline, surveying, structural engineering, or architectural technology would of course be an ideal starting point for giving retrofit advice. There are also variety of retrofit focussed short courses available. **Please see appendix 4 for more detail**.

Software and modelling options

There are various options available for retrofit related software outside of the framework of PAS2035. See table, below.

What do you want to do?	Example of software	Details
Giving advice to individual householders – modelled	Home Retrofit Planner	This is a SAP-based tool created by People Powered Retrofit. It incorporates additional data inputs and a householder questionnaire to enable the creation of a more detailed and bespoke report than is possible with most existing SAP based software. It allows assessors to model a series of retrofit scenarios as a progressive sequence or alternative options, and produces an in-depth report with lots of generic and bespoke information about changes in building performance with each measure or scenario. There is an open source version of the software available here. See Appendix 5 for more detail on SAP.
	Passive House Planning Package (PHPP)	PHPP is a tool developed by the Passive House Institute to assist with the design of low energy buildings and to certify buildings designed to the Passive House Standard. It tends to be used for high end retrofit projects where the aim is to achieve the challenging performance targets set for energy demand and airtightness under the Passive House retrofit standard, EnerPHit. The software requires specific data for all materials used in construction, rather than assumptions based on age, wall thicknesses etc. This includes manufacturer's details for different parts of windows, and all electrical appliance consumption figures.
Giving advice to individual householders - measured	Thermal imaging	Uses an infrared camera to see the range of temperatures throughout a dwelling – highlights cold spots caused by draught, leaks and missing insulation. The methodology can range from a camera attached to a smartphone, all the way up to a professional service costing several hundred pounds. The accuracy and detail of the survey will be reflected in the price. In Somerset, thermal imaging cameras are available for residents to borrow from local libraries. Energy Tracers and CHEESE are examples of community based thermal imaging projects which are providing low cost thermal imaging surveys.
	Airtightness testing	The testing of a property's airtightness, to indicate specific areas which are losing heat via draughts, and to give an overall figure for the air permeability as a number. Thermal imaging and airtightness are sometimes used together – the pressurisation exaggerates the cold areas making them easier to locate. These tests can be carried out in different ways, but would always involve the use of proprietary equipment and methods.
	U-value testing	Real life measurement of heat transfer across a building element – useful for less common materials and build ups and when more detailed information is preferable for the design of heat pump installations. Again, these tests are carried out by professionals using specialised equipment.

What can you expect to earn?

People who are paying for advice are purchasing information and will expect this to come as a product in a format that's renumerate to the fee paid. If someone pays £30 then an email may suffice, but if someone pays several hundred pounds then they will expect a more finished product and potentially some further follow-up. Customers who've paid for a service often have higher expectations when it comes to the advice they receive.

To provide a finished product you will typically need to use a software tool to identify improvements (i.e. thermal imaging) or generate scenarios for future changes to their building (i.e. using SAP based software). The time taken to do the survey or use the tool will need to help define the fee paid. There will also be license, hardware and other direct costs to consider. All your costs of providing the service need to be covered by the price, but it would also be sensible to benchmark your proposed price against similar services provided by other organisations particularly in your local area.

Working with private landlords

At noted in section 2, MEES requires that private landlords ensure that their rental properties achieve a minimum level of energy efficiency, which is due to increase over time.

PEC's experience of working with landlords, however, would suggest caution in expecting a clear income stream from working with private landlords. In a project delivered with Plymouth City Council, supported by some Energy Redress funds, PEC wrote to 546 landlords that they believed (based on council tax data and EPC data) to be renting non-compliant households. They informed the landlords of the regulation and offered general phone advice to support. As part of the package, they offered an 'EPC+' service where landlords would get a repeat EPC (to check if their home is still below standard) and an accompanying report that would provide more practical information based on their home about how best to bring it up to standard. Initially this was offered at £90, but it was reduced (further subsidised) to £75 during the course of delivery.

PEC's evaluation of that project found that 34% of landlords receiving that mailout went on to commission a compliant EPC within a year (compared to 7% of the ~500 landlords they identified but didn't mail out to). However no EPC+ visits were commissioned, not one landlord agreed to pay as little as £10-£25 extra to receive advice. While there will likely have been a number of reasons for this and more thought into the targeting and presentation of services would likely yield a better result, the evidence of this project is that caution should be used when building a business model on the idea that landlords will pay for advice.

Engaging with the supply chain

Community groups are ideally placed to encourage collaborative working on retrofit and to create new links across various parts of the supply chain, which can be complex and not always well

connected to other parts of the industry. Group members may have friends or relatives who work in related trades, or have contacts for contractors who have done work at their homes which can be utilised. Your knowledge of your local area, and the businesses who operate there, is vital.

One way you could undertake this type of activity is by starting a register of local contractors who work in related trades, with testimonials from customers. Householders are often uncertain about who to use for work, and having a trusted local list of contractors would encourage them to take steps to get work done. This could take the form of a basic list which is maintained and added to regularly, or could even be a cooperative which businesses pay to join. Some examples are:

- The Futureproof Associate Builders scheme: Futureproof pass on a list of building companies or contractors to their clients who have received a retrofit survey. To make it onto the list the contractors, who typically were already involved in retrofit and sustainable construction, need to complete the Futureproof Essentials training course offered by The Green Register.
- People Powered Retrofit's contractor network: onboarding process involving various certifications, financial checks and inspections of work, and agreement to a Code of Conduct.
- Retrofitworks contractor cooperative for regional schemes including Cosyhomes Oxfordshire, ecofurb (London) and Warmer Sussex: vetting process, code of conduct and £400 (paid after first project) in exchange for pre-qualified leads, design guidance, technical support, forums and training, and discounted membership of the Federation of Master Builders (FMB) and Trustmark.
- The Somerset project 'Somerset Retrofit Accelerator' green directory which includes contractors and other businesses in Somerset and beyond

Other examples include:

- Encouraging tradespeople to move into new areas of work by informing them about the demand in their areas. This could be linked with householder engagement and advice activity.
- Helping to facilitate links between local colleges and businesses.
- Providing training for tradespeople on thermal imaging – what it is and how to interpret the results. The Warm Up Skill Up Energy Tracers training for tradespeople is an example of this – see appendix.

Challenges

It's important to be aware of some of the challenges you may face when engaging with the supply chain.

The relevant trades are already very busy so there is little incentive for new workstreams for many businesses, especially as retrofit work is often bitty/fragmented, unknown (hard to price) and messy (compared to new builds, extensions and loft conversions).

On the other hand, it can be difficult to have professionals follow a staged retrofit – smaller jobs are harder to find people for, such as just insulating a floor, wall or roof.

The construction industry can be conservative and it can therefore be challenging to find time and willingness to undergo training and use new or unfamiliar methods and materials.

Some contractors who are specialists in retrofit are heavily focussed on the grant funded market and will not do any self funded work at all. Conversely, amongst contractors who tend to work more with self funded customers, there is scepticism of any grant schemes which have previously been short lived (such as the Green Deal and Green Homes Grant) with a 'gravy train' of poor work at inflated prices. They may not even be willing to engage with any certification at all, even if the requirements are fairly minimal, such as Trustmark's Licence Plus.

Suggestions for places to find contractors

- Checkatrade (www.checkatrade.com/consumer). Online vetting scheme across a wide range of trades. Twelve thorough checks including qualifications, insurance and experience. Agree to six quality standards as well as verified customer reviews. 12-month work guarantee up to £1,000.
- Similar schemes through Mybuilder (www.mybuilder.com/how-it-works) and Rated People (www.ratedpeople.com/c/how-it-works).
- Trustmark: Government-endorsed quality scheme for work in and around the home. Searchable by location and measure. Extensive and costly registration and vetting process – need to go through a 'scheme provider' such as the FMB, the largest and only provider explicitly for builders.
- License Plus by Trustmark: unlike government grant funded work which requires full PAS2030 and 2035 compliance, License Plus is less stringent and has been developed for emerging markets such as the green investment and lending areas. Businesses must still be Trustmark registered, but the project pathway is simplified compared to PAS2035 and PAS2030 certification isn't required for contractors. It works alongside key principles of PAS2035 such as the 'whole-house approach' and unbiased advice for customers, and provides a pathway for tradespeople with oversight, audit and compliance. Requirements for the project include: the provision of a retrofit assessment and pre-works EPC; ensuring the customer has impartial advice; agreeing a contract to deliver the work; provision of a post-works EPC; provision of financial protection for the work completed; and the lodgement of details in Trustmark Data Warehouse.

Insurance and other legal considerations

You will need to check with your group's insurance providers to confirm that your insurance covers the provision of advice.

If staff delivering retrofit roles are employees then any cover under an organisation-wide combined policy will pick up their liability while they are carrying out their work. If they are sub-contractors then they will need their own liability insurance in place. Depending on the situation and who was at fault would determine whose insurance would foot the bill.

An organisation's public liability Insurance covers the organisation against any third-party damage or injury while employees are carrying out their work. Employers' liability insurance covers the company against any workplace illness or injury caused to employees. Professional indemnity insurance covers the company against any advice from the organisation that may lead to a third-party financial loss (if the organisation is deemed negligent).

Anyone visiting people at home or spending time with people on a one to one basis is likely to need an enhanced DBS check, so you need to allow budget to cover this.

Appendix 1. Retrofit income models

Establishing a service from these business models

Establishing a business model for retrofit services is often complicated and quite locally dependent. The information below provides some examples of how community energy groups and third sector organisations have exchanged services to access the income streams listed above.

ECO	
Specific examples of business model in action	Widespread use including PEC and CSE's services under ECO 3 and predecessors.
Service offered	Eligibility checking. Retrofit advice. Support for household managing complaints. In some cases (CSE's work), this has been coupled with retrofit assessments and technical surveys – supplying the installer with install ready jobs.
How the service benefits households	The service charges installers for the work they will pay for (eligibility checked leads) and uses this to leverage better information about offers available and to fund the ability to track installs and pick up issues with the installers on the customers' behalf. In the case where assessments have also been offered, this can lead to a consistent and quicker service than an installer sending a surveyor who may have to travel a long way. There is a common perception in the industry that harm may be caused by taking money from installers for this work. The view is that this either increases the price and makes it less likely for the grant to fund the work, or that the community energy group is not impartial. In reality, the cost of lead generation is costed into work already and as long as community energy's rates aren't above average for this then they will not inflate prices. Also, almost all installers are happy to pay for leads from community energy (with sufficient volume) so, as long as there is a robust criteria established for choosing what installer to work with (based on best value to the customer), these concerns can be mitigated.
What income is derived from the service	For eligible leads, the rates community energy charge have historically been very low (£50 per measure that goes on to be installed being relatively standard). A well run scheme may typically convert 30% of leads into installations, although this will be lower under PAS2035. However commercial rates for leads have typically been far higher than this. Where install ready installs are delivered, rates are conceivably much higher, approaching £1000.
Strength of business model	For advice and eligibility only services rates are not sufficient to cover the costs of the advice work. It has tended to cover the cost of managing the relationship and supporting the customers through installation, which in turn better informs the advice.

Local Authority Delivery – Devon Example	
Specific examples of business model in action	Devon County Council have been delivering LAD and HUG projects for over two years. Rather than procuring a single installer for these works, they have segmented the different services into four lots: 1. Installation 2. Project management 3. Retrofit Design 4. Lead generation, eligibility checking, retrofit assessment and retrofit coordination.
Service offered	The final lot above is being delivered by four organisations across the county: Exeter Community Energy, 361 Energy, South Dartmoor Community Energy and Tamar Energy Community. They are engaging with customers locally, completing retrofit assessments and coordination and passing the jobs onto retrofit designers and installers at the appropriate points in the customer journey.
How the service benefits households	They access friendly, impartial local services that are more responsive and trusted than in other models. Other services and support available are flagged by local experts to deliver added value. A third party organisation is resourced and fully aware of the details of the job to support households where there are issues with any installer.
What income is derived from the service	A fee from Devon County Council for each job is paid to the community organisation.
Strength of business model	This has allowed these agencies to recruit and retain retrofit assessment and coordination capacity.

Local Authority Delivery – Plymouth Example	
Specific examples of business model in action	Plymouth City Council have been delivering LAD and HUG projects in partnership with Plymouth Energy Community since LAD 1a was launched. This approach, labelled 'Futurefit' was led by concerns that procurement of installers often does not drive better value and would likely exclude local installers. In response to this, they established a grant led model, where householders can apply to the council for a grant to pay for the works. With previous grant led models there has been criticism that they are too unclear for households and installers do not sufficiently engage. Under this scheme Plymouth Energy Community (PEC) were appointed to address these challenges.
Service offered	Eligibility checking Retrofit Advice Retrofit Assessments Supply chain coordination Grant administration support Customer support throughout.
How the service benefits households	The scheme was designed to provide better customer service through putting a local community organisation in charge of the customer journey. It was also designed to allow local installers to participate, delivering better value and quality as these installers are dependent on local trade for ongoing work. In LAD1a, 127 households were supported and when asked to score out of 10 the likelihood of recommending the service to friends and family the result was an average score of 9.6. Moreover, the capital cost of measures was 11% below national average for the scheme with 99% of the funding being spent within Devon and Cornwall.
What income is derived from the service	PEC and PCC have a grant agreement in place to grant administrative funds for PEC to deliver their obligations in the scheme. PEC also charge capitalised fees to each project for retrofit assessments and grant administration.
Strength of business model	PEC have built a team of full time employed advisors and support staff with good relationships with retrofit coordinators. This is highly dependent on a close and collaborative relationship with the local council.

Self funded – Futureproof	
Specific examples of business model in action	Futureproof is a partnership between CSE and The Green Register. It provides tailored support for households to understand their options to help mobilise demand for retrofitting. It then works with the supply chain to mobilise existing trusted contractors to competently meet this demand. Futureproof seeks to engage contractors to connect them up with well informed, engaged customers. To enable this relationship, it provides contractors with information about the business opportunities, training to skill up to deliver and support from retrofit coordinators to ensure quality is maintained over the process.
Service offered	Advice Retrofit Coordination Supply chain coordination Training Quality assurance
How the service benefits households	Advice support to plan retrofits Support to manage retrofit Better access to competent, engaged installers
What income is derived from the service	Fees for advice work
Strength of business model	Not dependent upon grant funding, so the service can be offered continuously. Able to offer independent advice which is not contingent upon measures being installed and is tailored to each individual householder. However, it can be challenging to find householders who are willing to pay the full fee for advice so supplementary funding can help make the service more appealing.

Self funded – People Powered Retrofit	
Specific examples of business model in action	People Powered Retrofit has been established by Carbon Co-op. Carbon Co-op are a cooperative of households who are interested in improving the energy efficiency of their homes. Over 10+ years they have developed services to provide support through every stage of the retrofit journey including advice, retrofit coordination, retrofit design and project management. They have also developed training for contractors and have begun to create income streams from socially franchising their service designs.
Service offered	Advice Retrofit Coordination Supply chain coordination Training Quality assurance White-labelled systems for providing advice
How the service benefits households	Advice support to plan retrofits Support to manage retrofit Better access to competent, engaged installers
What income is derived from the service	Fees for advice work & Coordination Training fees to installers Social franchising income
Strength of business model	In 2021, Carbon coop raised £731,749 in community shares with a 5% forecast return on delivering this business model. Their fees for supporting retrofit are charged at each stage but vary from 10-19% of the cost.

One-stop shops	
Specific examples of business model in action	An all-inclusive or coordinating one stop shop is a service designed to provide everything a household needs under one roof. Likely to include engagement of households; advice, design and delivery of a retrofit; Coordination of the whole process; financing; and assurance of the results with post work monitoring. Many people would consider People Powered Retrofit to be an example of a one stop shop, although it doesn't include a finance offer. The Energy Cities, Horizon 2020 funded 'INNOVATE' project explored retrofit one stop shop models across Europe and explores these and some case studies in this report, which includes the UK based Retrofit Works Model.
Service offered	Advice and support to plan Support to manage retrofit Supply chain management Quality Assurance Finance links
How the service benefits households	This service is designed to simplify the offer and provide excellent customer experience by ensuring the customer is dealing with one organisation which are on top of all of the detail of what is happening in their homes.
What income is derived from the service	Models vary. Principally the income is derived from customers paying for advice and support. In some cases, the income is derived from installers adding a fee to the eventual installation cost and one example seeks to monopolise the parts business by becoming the supplier of all the parts to retrofits and building a profit margin to this.
Strength of business model	Challenging. It isn't clear if any of the models supported under INNOVATE are now trading free of subsidy. Grant funded public support is likely to be a prerequisite of offering this sort of service, although the advantages it provides in terms of simplicity for households and scale is likely to be of interest to government and local authorities. UK examples of one stop shop approaches (Retrofit Works and People Powered Retrofit) have attracted substantial public funds over the years to support development.

Appendix 2. Case studies

Case study 1: Warm Up Skill Up

Work with Bristol City Council and householders

The Warm Up Skill Up project was developed in partnership by Bristol Energy Network and Energy Tracers and was delivered as part of a demonstrator pilot project in conjunction with Bristol City Council's (BCC) Green Homes Grant initiative in 2021-2023. The project supported a whole house and fabric first domestic retrofit strategy with a group of 25 homes funded through the Local Authority Delivery Scheme (LADS).

Warm Up Skill Up adopted an approach informed from an initial domestic Energy Trace, a unique thermal imaging protocol which uses thermal imaging along with calibrated depressurisation and householders' behaviour assessment. The Energy Tracer process aims to help householders understand how heat is lost and air moves through their homes. It introduces them to the importance of airtightness, and helps them to understand concepts around moisture balance and the need to ensure an adequate level of ventilation without compromising comfort or increasing carbon emissions.

The Energy Trace was the first step on the householder's retrofit journey. They were then given training and guidance to carry out 'do it yourself' basic, or 'shallow' retrofit measures as a cost effective way of quickly improving the thermal efficiency of their homes, and looked at ways to overcome barriers for this type of action. This was delivered via workshops with groups of householders.

The results of the Energy Trace were also used to inform more advanced or 'deep' retrofit works, providing additional information for the retrofit assessment than is required under PAS2035, preparing homes for improved insulation and supporting householders towards transition to a heat pump or connection to a heat network.

Pete Bryant from Fishponds had an Energy Trace of his home completed in March 2023 and got to work right away on measures to fix water ingress on his flat roof. Previously he was aware there was a problem but did not know how or where to address it. Following his Energy Trace, he has felt more confident to address the issue and fill in the leak that was identified. Pete also addressed issues with draughts around his windows and gap above the boiler leading to his loft, all showing significant heat loss during the survey.

Once work has been completed on the basic measures he stated that he feels confident to invest in deeper retrofit measures to address the remaining issues of heat loss. He is able to review the Energy Trace on his laptop, as with all clients, a copy has been provided to him on a memory stick. This protocol allows all clients to review the survey and potentially to share this resource with future trades persons as well as inform retrofit assessments in line with PAS2035.

Assessing retrofit work in situ

The Energy Trace methodology was also used to confirm whether installed retrofit measures were completed correctly, as it is able to identify if there is any unexpected air infiltration after completion. It includes measurement of airtightness pre and post-works, which has the potential to demonstrate benefits of contracted works, taking evaluation beyond anecdotal or crude EPC measurement, which do not include airtightness within the energy performance assessment process.

By increasing client knowledge and confidence, client expectations of the industry are slowly but steadily being raised. Residents receiving the Energy Trace are better informed of the PAS 2035 process and understand questions they should ask installers undertaking works in their properties.

Warm Up Skill Up for tradespeople - Understanding PAS2035 and Thermal Imaging Interpretation Course

Warm Up Skill Up and Energy Tracers created training for tradespeople on the interpretation of thermal imaging surveys. The training session is suitable for architects, contractors, project managers, retrofit assessors, retrofit coordinators, and householders who are interested in learning more about retrofitting buildings to improve energy efficiency.

It covers topics including common faults in buildings, low-cost energy saving measures and retrofit routes from light-touch do it yourself measures to deep retrofit and PAS 2035. The importance of engaging retrofit contractors to understand and interpret thermal imaging using Energy Tracer methodologies and training is an important part of the process to informing retrofit design.

The training helps attendees to understand why an initial thermal imaging survey is the best way to identify energy losses in an existing building, and how this can empower householders. It also covers how to interpret thermal imaging output and how to use the data to inform retrofit strategies under PAS2035 and PAS2030.

Case study 2: CSE's experiences of the challenges of providing PAS2035 compliant retrofit assessment and coordination

CSE has worked with local authorities in Bristol and Somerset to deliver several local authority funded schemes since 2021. Below are some of the challenges experienced during these projects.

Communicating with a wide range of stakeholders:

The retrofit coordinator acts as a central point of contact on PAS2035 jobs and is responsible for communicating with the householder, installer, designer, scheme funder or manager and retrofit assessor. Different stakeholders have different priorities, and it can be challenging to find solutions to problems which everyone is happy with. Regular communication with the householder can help prevent cancellations, especially by providing an early explanation of what surveys will be required, which organisations, will be getting in touch, any delays expected, ventilation upgrades requirements, benefits of measures and any risks or things to be aware of.

Documents for PAS2035 compliance:

Jobs which are lodged to Trustmark are frequently audited so careful attention is needed to ensure all the required documents have been provided and are up to date. This often involves chasing contractors to provide or update documents.

Ventilation requirements:

There is often resistance from householders to have ventilation upgrades installed. Ensuring adequate

ventilation is a requirement for PAS2035 jobs where fabric measures are being installed. This requirement and the logic behind it should be explained to householders at an early stage (e.g. on or before the retrofit assessment), and may need repeating at later stages. This should help to avoid householders cancelling at a late stage due to not wanting ventilation upgrades.

Installer availability and waiting times:

There is a high demand for installers, and for certain measures there are not enough Trustmark accredited installers to adequately meet this demand. Consequently, there can be long lead times for certain measures to be installed. This can also be related to the supply chain of materials. Householders should be made aware of this at an early stage to manage expectations. In some cases, installers have so much work that they may need to turn down certain jobs.

High risk properties:

There are additional tasks required for retrofit coordinators working on properties designated as high risk. Listed buildings and buildings in conservation areas are designated as such, and there are additional surveys, permissions and restrictions in place which can hinder or prevent installation of certain measures. Some installers may also be reluctant to work on this type of property.

Remedial issues:

Common defects such as damp and mould, cracks in walls and damaged roofing felt can make straightforward installations much more complex, time-consuming and expensive. Many contractors will not be able to resolve defects themselves and the retrofit coordinator may need to find another contractor for the remedial work.

Multiple surveys required: Householders should be made aware that multiple home surveys will be required as part of the PAS2035 process, and that some can take several hours. This can be stressful for some householders and the purpose of each survey should be explained clearly.

Handover documents for householders: Householders should be provided with handover and commissioning documents for their new energy efficiency measures, which help them understand how they work, describe the maintenance requirements and provide proof of guarantee. Occasionally these documents are not passed to the householder, so the retrofit coordinator (or evaluator) should check for this when carrying out monitoring and evaluation. Householders often want to see documents from the retrofit assessment, but these documents are not a 'retrofit plan' and are intended to be reviewed by installers and coordinators.

PEC's work on local authority funded schemes

PEC have worked on several local authority funded retrofit projects including LADS and HUG.

The record of these projects with regards to timely efficient delivery is poor. This is evidenced by the lengthy extensions and failure to expend the funds allocated. The experience of delivering these funds has also been challenging. There have been occasions where the need to allow for an extension has been flagged to central government six month before the end of the project but this extension has only been processed in the last month of delivery. Moreover, the combination of eligibility criteria, delivery restrictions and restrictions placed by PAS2035 mean that is it commonly not possible to identify who may benefit from the scheme at the first conversation. Even eligibility is hard to determine.

We had a situation where we were operating with a maximum quota of 50% grade D homes, the rest had to be grade E or below. Our advisors were checking for previous EPCs and checking for improvements that had been made to the property since then to estimate the likely SAP grade. We submitted 79 clients for assessment with an average prior EPC score of 48 (E grade). 20 of these were already grade D and based on our knowledge of improvements we expected this this number to grow but to be less than half (40). When we received retrofit assessments back, 54 were grade D. To maintain our 50% quota, we would have to reject 29 D grade applications, many of which were low income and had little to no insulation but had a modern combi boiler.

Unfortunately, EPCs are unreliable as they are often rushed and have poorly condensed the property into a simple model. Retrofit assessments tend to be more thoughtfully delivered and model the property more fully. In addition to this, the RdSAP algorithms that calculate the score change over time. We replicated old EPCs in the current software and found that, on average, properties score 6 points higher now than they would have done in 2014. The data from our surveyed properties found that only 32% of jobs passed to retrofit assessment remained within 5 SAP points of their prior EPC. One job jumped from a SAP score of F22 to D68 and there had been little to no improvement to the property. Some jobs also go down in score, 2 D rated properties on prior EPCs became E rated on retrofit assessment. This brings a level of chaos to delivery that is very hard to manage.

Justin Bear, Plymouth Energy Community (working on Plymouth City Council's Sustainable Warmth Fund project). The cap on D rated properties on this scheme was later increased to 80% and D rated properties have been included in HUG 2.

Appendix 3. Current funding schemes

This is correct at the time of writing (April 2023)

Name	Funder	Eligibility criteria	Overview	What can the funding be used for?	PAS2035 required?
Home Upgrade Grants (HUG)	Central government	An EPC rating of D or below (an EPC will be done if there isn't one already), and the householder must be in receipt of a means tested benefit, or have a household income of less than £31,000 and have savings of less than £30,000. Alternatively, anyone living in an 'indices of deprivation for income' area rated 1-3 is eligible, regardless of their income or savings.	This is a £2.5bn scheme aimed at properties which are not heated by mains gas and is available for both owner occupiers and private tenants. It started in 2023 and runs until 2025. The funding is distributed by local authorities, who must have submitted a bid for a project in order to be able to access the funding. They are responsible for managing delivery of the whole process from initial householder engagement through to install.	A wide range of measures including insulation, renewables and low carbon heating (I.e, no fossil fuel boilers). There is a requirement to achieve a minimum level of improvement to the property's EPC rating. There are caps on the amount of funding that each property can have. This can also be dependent upon the EPC band – more may be available for those properties in the lowest band. Owner occupiers are not expected to make any contributions toward the install, although landlords are.	Yes
Energy Company Obligation (ECO)	The largest energy companies, who are obliged to provide funding as part of their licence.	Households across the UK can qualify if they are in receipt of means tested benefit, or in receipt of child benefit and on a low income. It doesn't matter what the EPC rating is for these two criteria. The following criteria are only available to households who live in certain areas. It's known as ECOflex and depends on the local authority: People with an annual household income less than £31,000 AND an EPC rating of E, F or G (or D if they own their home). People with a severe or long term health condition and an EPC rating of E, F or G. People who are struggling to pay their energy bills and an EPC rating of E, F or G.	The current iteration is ECO4 and runs from April 2022 until March 2026. It is expected to cost £4bn. The target is divided between suppliers based on each supplier's relative share of the domestic gas and electricity market. It can be used in social housing, privately rented and owner occupier properties.	A range of measures including insulation, boiler repairs and new mains gas boilers. The amount of funding varies a lot depending on the supplier, the property, the measure being installed. There are sometimes requirements that certain measures can only be installed in conjuction with other measures. Sometimes, owner occupiers are expected to make a contribution, and landlords always will.	Yes
Social Housing Decarbonsation Fund (SHDF)	Central government	Social housing tenants, who are on a low income.	This funding is currently in phase 2 (from April 2023) and the total amount of funding is £800m. The funding is distributed by local authorities, usually in partership with a social landlord, who must have submitted a bid for a project in order to be able to access the funding. They are responsible for managing delivery of the whole process from initial householder engagement through to install.	A wide range of measures including insulation, renewables and low carbon heating (I.e, no fossil fuel boilers). There is a requirement to achieve a minimum level of improvement to the property's EPC rating. There are caps on the amount of funding that each property can have. This can also be dependent upon the EPC band – more may be available for those properties in the lowest band.	
Connected for Warmth	National Grid Support Fund	Owner occupiers and private tenants in council tax bands A to D.	Although it is a national scheme, it is currently only available in some areas. This can be checked here.	Loft and/or cavity wall insulation.	No
Boiler Upgrade Scheme (BUS)	Central government	Current heating system must use oil, gas or electricity (other than a heat pump).	Funding to encourage the uptake of heat pumps (and biomass boilers). It began in 2022 and was recently extended to 2025. More information is available here www.gov.uk/apply-boiler-upgrade-scheme.	Air source heat pump, ground source heat pump, biomass boiler.	No
ECO+, or 'The Great British Insulation Scheme'	Energy suppliers	Likely to available to those living in homes with an Energy Performance Certificate rating of D-G, or those within Council Tax bands A-D in England and A-E in Scotland and Wales	This is a new scheme which was announced at the end of 2022, initially called 'ECO+' but the government have stated that they intend to call it 'The Great British Insulation Scheme'. The design of the scheme is still out for consultation.	The focus will be on single measures, likely to be loft and cavity wall insulation.	No

Appendix 4. Retrofit courses

Course provider	Course details	Website	Cost
The Association for Environmentally Conscious Builders (AECB)	The well-established CarbonLite Retrofit Foundation course is aimed at construction professionals and those whose role involves decision making around retrofit	https://carbonlite.net/	£410+VAT (AECB membership required - £39-84)
The Green Register	The Futureproof Essentials course is an introductory suite of lessons to help you start to understand the Whole House Retrofit (WHR) approach. It is aimed at a wide audience including contractors and tradespeople, architects, building surveyors, housing and maintenance teams, building control, planning officers and energy advisors.	www.greenregister.org.uk/online-courses/	£299
Centre for Alternative Technology (CAT)	A 4-day Eco Refurbishment course on site, 'ideal for builders, architects and anyone who wishes to undertake their own refurbishment of an existing building'	https://cat.org.uk/events/eco-refurbishment/	£600 (including accommodation).
Building Research Establishment (BRE) Academy	Domestic Retrofit: entry level 3-hour online course	https://bre.ac/course/retrofit/	£140+VAT
CIOB Academy	Energy Efficiency Retrofit – a 1-day online course covering all environmental impacts of buildings, building inspection methods, assessment of energy performance, retrofit measures – choosing and designing, planning and managing a retrofit project, current policies, regulations and standards, and opportunities within	www.ciobacademy.org/course/energy-efficiency-retrofit/	£295+VAT
Carbon Coop	Manchester's Carbon Co-op offer regular webinar training sessions which are recorded and remain online, from Beginner's Guides to measure-specific technical workshops.	https://carbon.coop/training/	Free

Appendix 5. PAS and SAP

PAS2035:2019

PAS2035:2019 is a British Standards Institute (BSI) Publicly Available Specification (PAS), first published in May 2019. It is not a BSI Standard, but is a framework for project delivery. After the failure of the Green Deal and some high-profile cases of disastrous retrofit schemes in the early 2010s the government commissioned the Bonfield 'Each Home Counts' review. This review has subsequently led to the establishment of the PAS2035 and substantial changes in the industry regarding how technical risk is managed in projects. You can read more online about the purpose and history of PAS2035 **here** and **here**.

PAS2030:2019

Some installers have been reluctant to gain PAS2030 accreditation because of the paperwork, fees, and ongoing assessment involved to maintain their accreditation. Since this only enables them to work on government funded schemes, and these schemes have not been consistent or reliable over recent years, installers have often not seen a business case for gaining certification. Therefore, installers who are PAS2030 certified tend to be larger (or under the umbrella of a larger company), and with experience of working on previous government funded schemes such as ECO. However, the government is keen to expand the list of certified installers and has given out funding to try and encourage this. See the section on 'Delivering grant funded retrofit' for more detail on this.

SAP

The Standard Assessment Procedure, or SAP, is the government approved methodology for the energy assessment of dwellings. It is primarily used as a compliance tool for meeting building regulations in new buildings.

SAP works by assessing how much energy a dwelling will consume when delivering a predefined level of comfort and service provision. The assessment is based on standardised assumptions for occupancy and behaviour. This enables a like-for-like comparison of dwelling performance.

The annual energy use is converted to annual energy cost, CO_2 emissions and primary energy use using national average tariffs and conversion factors. The SAP Energy Rating is then derived from the annual fuel cost divided by the floor area on a scale of 1-100+, where 100 corresponds to net zero energy cost (the score can go above 100 if there are renewable technologies which pay an income above the estimated energy costs). There is also a similar Environment Impact Rating that is based on the estimated CO_2 emissions.

A 'full SAP' assessment Energy Performance Certificate (EPC) is required, by law, to be carried out on any property which was built after 2008. Specialist on construction Domestic Energy Assessors (OCDEAs) carry these out. The OCDEA is able to calculate these using the plans from the architect. They are also able to verify all mechanical and electrical services which are in the dwelling, so these EPCs are – in theory – more accurate than those carried out on existing dwellings.

EPCs for existing dwellings have also been a requirement since 2008, but only at the point at which a property is put up for sale, or rented out. These EPCs are created using a less detailed version of SAP, called 'reduced data SAP' (or RdSAP). This requires fewer data inputs than full SAP.

The main reasons that RdSAP is used for EPCs instead of full SAP is that a) the details of the construction of

existing dwellings is often unknown and b) to reduce the time and cost associated with producing EPCs at scale. It uses default u-values based on the age, built form and construction of the property where full details cannot be confirmed. These defaults are based on the 'least unlikely' details so they may assume better or worse performance than is really the case. It also reduces the measurements required with inferences that are used for, for example, the window area and the areas of the different elements of 'rooms in the roof'. You can read more about EPCs here.

SAP is updated periodically by a group of experts led by the Building Research Establishment. A new version of SAP, SAP10, was introduced in 2022. This was timed to happen at the same time as building regulations were updated. When SAP is updated, RdSAP is also updated, but some time later. At the moment, the version of RdSAP (9.94) which is in use is still based on the old version of SAP (SAP2012). This means that some of the assumptions are out of date. This can have a significant impact on the accuracy of modelled improvements using RdSAP.

centre for sustainable energy

COMMUNITY RETROFIT GUIDE

www.cse.org.uk