Domestic Retrofit:

the challenges and opportunities in Cheshire and Warrington

Version 6 Final

for

ABOUT THIS REPORT

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Executive Summary

Background

Large-scale domestic retrofit is essential if the UK is to achieve its net zero target by 2050, and can unlock substantial economic gains – both for residents and for local supply chains. This report details the nature of the challenge presented by large-scale housing decarbonisation in Cheshire and Warrington, and highlights the opportunities to unlock and deliver the benefits of this activity.

This report is the output from research commissioned by the Cheshire and Warrington LEP with the support of the government backed NW Net Zero hub, and developed with Cheshire East Council (CEC), Cheshire West and Chester Council (CWaC), and Warrington Council (WBC). The commission was to develop an evidence base for Cheshire and Warrington to understand the challenges and opportunities of decarbonising the sub-region's housing stock.

To do this, we:

- Completed a baseline assessment/ modelling exercise for every domestic property across Cheshire and Warrington, creating three retrofit scenarios (outlined within our accompanying report).
- Took a collaborative approach by engaging with key stakeholders including industry, local authorities, and colleges to understand their current involvement in the sector and ambitions for the future.
- Conducted desk research to identify best practice from elsewhere and identify innovative projects which should be considered for rollout in Cheshire and Warrington.

Scale of the Challenge

The UK government has committed to achieve net-zero by 2050 for the entire country. Many Local Authorities have set ambitious targets that go beyond the national timeline for net-zero. Cheshire West and Chester and Cheshire East Councils are targeting net zero for their boroughs by 2045, and Warrington Borough Council targets net zero for the borough by 2041.

Domestic emissions account for 18% of total carbon emissions across the sub-region, and tackling this stubborn source of carbon emissions is a priority. Doing so would not only minimise carbon pollution, but also reduce fuel poverty and improve residents' quality of life. Increasing home insulation through retrofit activity is key to such proposals. The UK Government has mandated that all social housing achieve a minimum of EPC C by 2035, and the Climate Change Commission (CCC) recommends that EPC C is achieved for all domestic property by this date.

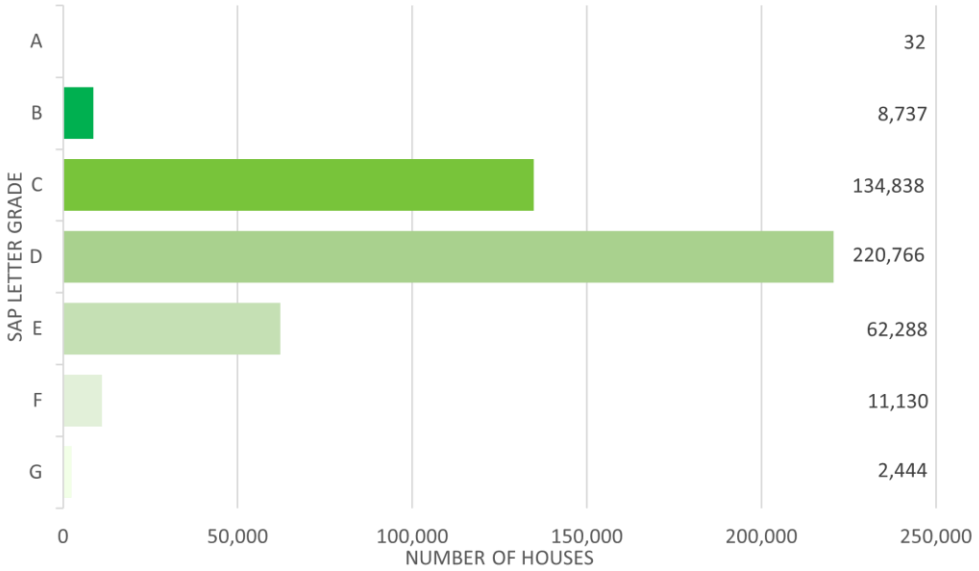
A range of retrofit work is ongoing across the three Local Authority (LA) areas, with Councils with social housing undertaking substantial work on their housing stock to improve energy efficiency for residents. There has also been significant uptake of Energy Company Obligation (ECO) grants over a 10-year period, resulting in the installation of thousands of retrofit measures in homes across the sub-region using monies accumulated from energy company profits in this central government led scheme.

Table 1. Uptake of existing grant schemes across Cheshire and Warrington.

Scheme	Cheshire East	Cheshire West and Chester	Warrington	Total
ECO Schemes (Single Measure) – Jan 2013-Sep 2023	15,988	15,582	10,513	42,083
HUG 1 – Full Home Upgrades	36	>5	0	~41
HUG 2 – Full Home Upgrades	300		0	300
SHDF Phase 1 – Full Home Upgrades	151	123	0	274
LAD Phase 1 – Number of Houses Upgraded	206	32	29	267
LAD Phase 2 – Number of Houses Upgraded	139	195	201	535
RHI – Accredited Installs Apr '14 – Mar '23	797	529	97	1,423

However, despite substantial work in the LA areas over this period, a range of grouped challenges prevent systematic housing retrofit across the entire housing stock. There are 440,235 homes in Cheshire and Warrington, and the average EPC score is 63.22 – or a letter ranking of D. To reach net-zero, decarbonised heating systems such as Air Source Heat Pumps (ASHPs) are required. Given the typical lower operating temperatures of ASHPs vs traditional gas-boilers, and the greater unit cost of electricity than gas, these are only affordable to operate in properties with a minimum EPC score of C, or ideally with a EPC score of B or higher. This could be achieved by: greater insulation, meaning that more heat is retained and less lost; by installation of solar panels with battery storage, to decrease the unit cost of electricity; or by a combination of both. Only 31% of Cheshire households meet the minimum EPC score of C, versus England as a whole where 47% of homes met this standard in 2021.

Figure 1 Sub-regional EPC score



Decarbonisation Scenarios

This work explores three related decarbonisation pathways for Cheshire and Warrington homes which align with local and national policy recommendations and mandates. These are outlined below:

Scenario 1: EPC C for all homes

> This scenario is in line with national policy that recommends EPC C as a minimum standard for all social housing by this date. The UK Climate Change Commission (CCC) recommends that all domestic housing meet EPC C by this date as an interim goal towards net-zero. This can be done by installation of cavity wall and/or loft insulation, alongside solar panels.

Scenario 2: Decarbonised heating with EPC B (using least invasive retrofit measures)

> National policy calls for net-zero in all sectors by 2050, with local policy aiming to reach net-zero in 2045 for Cheshire East and West, and 2041 in Warrington. This would require full decarbonisation of the housing sector which currently accounts for 18% of local emissions. However, this scenario recognises that there are substantial challenges associated with some retrofit measures (e.g. internal and external wall insulation and underfloor insulation). This scenario models net-zero for a majority of the housing sector through widespread ASHP uptake, alongside loft and cavity wall insulation.

Scenario 3: Decarbonised heating with EPC B (using a broad range of retrofit measures)

> Building on scenario 2, this scenario considers net-zero for a broader segment of the housing sector. This incorporates all measures identified for scenario 2, alongside widespread uptake of underfloor insulation, and internal and external wall insulation.

Our modelling of the current costs of retrofit estimates that scenario 1 would cost circa £1.2bn to achieve, with a substantial benefit to homeowners in terms of annual energy savings. Scenarios 2 and 3 represent a total retrofit economy of between £9.3-£10.1 billion, with the median investment per property being between £19,700-£21,000 (based on current prices). These schemes, if realised over a c. 10 year period would drive substantial investment in the region, greatly benefit householders, and help facilitate a just transition.

Whilst the costs of such a programme are substantial, these cost estimates do not include existing government grant schemes. Currently available government grant schemes for heat pump installation and ECO schemes for a single additional retrofit measure in a property could cut this to £12,200-£13,500 per property. On average, a home undergoing complete retrofit highlighted in scenario 2 would unlock a median saving of £1,025 per annum for residents. However, it should be noted that whilst the median price falls within this price range, a significant portion of properties are hard to decarbonise and cannot be decarbonised for less than the simulated price cap of £50k per household. Whilst scenario 1 is achievable for 99.4% of all homes beneath an acceptable price cap, scenarios 2 and 3 can only reach a maximum of 71% and 74.2% of all homes under this price cap. National government intervention may be required to reach this section of the population and ensure a just transition for all.

A substantial economic opportunity exists for regions that move first on implementing widespread housing decarbonisation. A majority of the costs associated with this work are in the manufacture and installation of ASHPs and solar PV technologies. Increasing the local supply chain for such

technologies would not only provide opportunities for Cheshire and Warrington's own housing sector but facilitate the area's placement as a leader in this sector for the UK economy.

Pathway to net-zero homes

A substantial portion of the analysis within this report focuses on scenario 2 – the scenario which reaches net-zero for a majority of the housing sector whilst recognising political, cultural, and economic barriers to wider deployment of a number of retrofit technologies. However, reaching this scenario can and should be done in a fabric-first manner[1] – i.e. energy efficiency retrofits should be installed prior to the installation of low-carbon heating technology. This would ensure that the running of these technologies is affordable and efficient, and enhance public acceptance of them. It also provides time and opportunity for potential grid-constraints from mass-uptake to be countered, and opportunity for alternatives such as low-carbon heat networks to be deployed in areas where this is appropriate. As such, in the immediate term, scenario 1 is a viable interim stage to aim for on the journey to implementing scenarios 2 or 3.

To achieve a co-ordinated strategic retrofit programme across the sub-region, this report identifies 9 key Grouped Challenges (GCs) that must be tackled. Identifying leadership on each of these themes, at a sub-regional or local authority area level, can create a virtuous cycle (see figure 2) that amplifies and accelerates the housing retrofit market.

[1] Whilst the UK government has moved away from this requirement in some policy areas, fabric-first ensures public acceptability of measures such as heat pumps by ensuring they do not place an undue burden upon the bill payer.

Figure 2 Key challenges and opportunities for housing retrofit.

Pooling resources across local authority areas at the subregional level could unlock new approaches to the challenge of housing decarbonisation, including increasing public awareness of existing retrofit schemes and engaging with investors**.**

This work should also be understood within the wider energy system, for example being conducted alongside development of a broader Local Area Energy Plan (LAEP). LAEPs are a strategic workstream involving many of the same stakeholder groups as the above programme, which map out the future energy system of an area and develop actionable workstreams to develop them. They typically include decarbonisation of industry, transport, and the whole energy system alongside housing. In practice they therefore require a detailed review of District Network Operator (DNO) capacity and heat network opportunities, which could feed into the Strategic Retrofit Coordination work if conducted in parallel.

This work should also be viewed in the context of ongoing retrofit skills work within the region. The North West Retrofit Skills Plan is expected to report in the near future, with recommendations to enable the creation of a workforce that can tackle this challenge at the scale required. Their recommendations should be incorporated into strategic work on housing retrofit in Cheshire and Warrington.

Opportunities for a Sub-regional Response

Whilst an overarching response is under development, an initial joint project, developed in co-ordination between LAs, the LEP, and interested stakeholders, would help establish a co-ordinated approach to the housing retrofit challenge. National and regional best-practice on One Stop Shop schemes such as Cosy Homes and Your Home Better (highlighted in Section 9) could be mirrored in Cheshire and Warrington. These projects collate existing resources in a single accessible online location, and provide easy access to advice, available central and local government grant programmes, and links to trusted suppliers of retrofit services. By creating a central hub to easily access retrofit, alongside providing easy access to trusted suppliers, this helps to promote retrofit, promote trust, and grow the retrofit market.

Building on case studies in other places, it is our view that a "Cosy Homes" equivalent in Cheshire and Warrington would cost circa £700-900k to establish, and become self-funded within a 5-6 year period. Development and refinement of a business case for such a programme would cost circa £65k-70k. There is potential for the LEP, in partnership with Local Authorities and others, to explore business cases for a one stop shop retrofit service in Cheshire and Warrington.

Conclusion

Accelerating property improvement locally will deliver multiple benefits in our communities beyond emissions reductions. These benefits include:

- Improving the quality of our housing
- Removing residents from fuel poverty
- Preventing illnesses caused by poor quality housing, creating savings to the NHS and social services,
- Securing jobs and creating new ones with a potential local market for retrofit work worth in excess of £10bn across the subregion alone.

Early initiatives will crystalise the business case for this work, identifying funding mechanisms for work across housing sectors. Whilst early work is likely to be focused on the able-to-pay market, a systematic decarbonisation programme would deliver on the reciprocal barriers identified above, and facilitate development strategies for wider decarbonisation efforts., Thereafter, initiatives to target the eventual decarbonisation of every home in the sub-region can be launched in a structured fashion based on priorities that are understood locally and not driven nationally.

The evidence from previous attempts to tackle housing decarbonisation in the UK is clear; small pilots that address one side of the problem are unlikely to provide lessons on which to build momentum. Much of the projected c. £10bn in capital expenditure needed to transform the sub-region's housing stock will be borne by private householders. To encourage such a transformative economic programme, public education and trust is necessary, and a structure to facilitate systematic transition must be the foundation of this. The stakeholders engaged throughout the development of this paper, including Local Authorities, the Cheshire and Warrington LEP, colleges and others, are uniquely placed to initiate such a programme and, working with stakeholders across the local area, drive forward home improvements that not only decarbonise this sector, but improve resident health, wealth, and quality of life.

1. Introduction

The Cheshire and Warrington LEP (C&W LEP) supported by funding from the North West Net Zero hub on behalf of Cheshire East Council, Cheshire West and Chester and Warrington Borough Council wishes to develop a greater understanding of the challenges and opportunities for decarbonising the housing stock in the sub-region.

A summary of the analysis of the current housing stock and potential routes to decarbonisation every domestic property in the region and each local authority areas have been included in the accompanying technical reports.[1] This work forms the basis of the recommendations in this report.

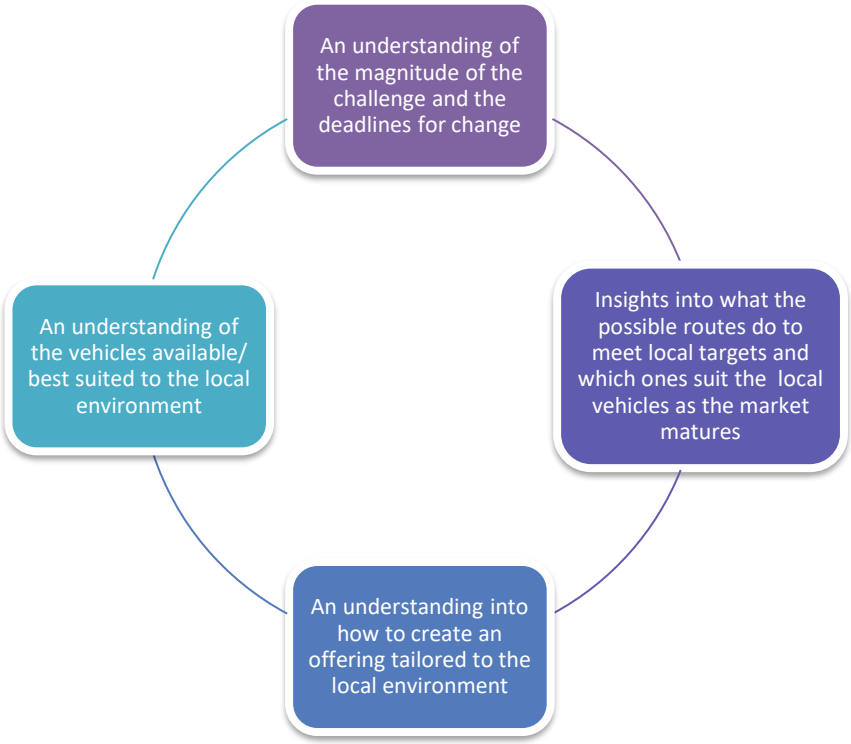
This report sets out the key socioeconomic drivers for the uptake of retrofit in the region, the potential components for a delivery mechanism to meet the needs of these decarbonisation routes and potential funding routes to progress this work.

The methodology for this report is to identify some of the things holding the market back, and how to reduce those. Thereafter, the report identifies some of the possible routes to reaching the end goal that has been identified in the technical report, and segments them into identifiable portions around which a delivery mechanism could be placed, and then:

- Removes some homes from retrofit challenge e.g. by identifying cost effective heat network opportunities.
- Identifies homes which offer multiple benefits and ought to be tackled as priority e.g.:
    - Those in areas of electricity grid stress and offer cost savings to the DNOs and the taxpayers.
    - Home of the fuel poor and the vulnerable.

To do this the report looks to provide:

Figure 1.1 Overview of report



2. Strategic Objectives

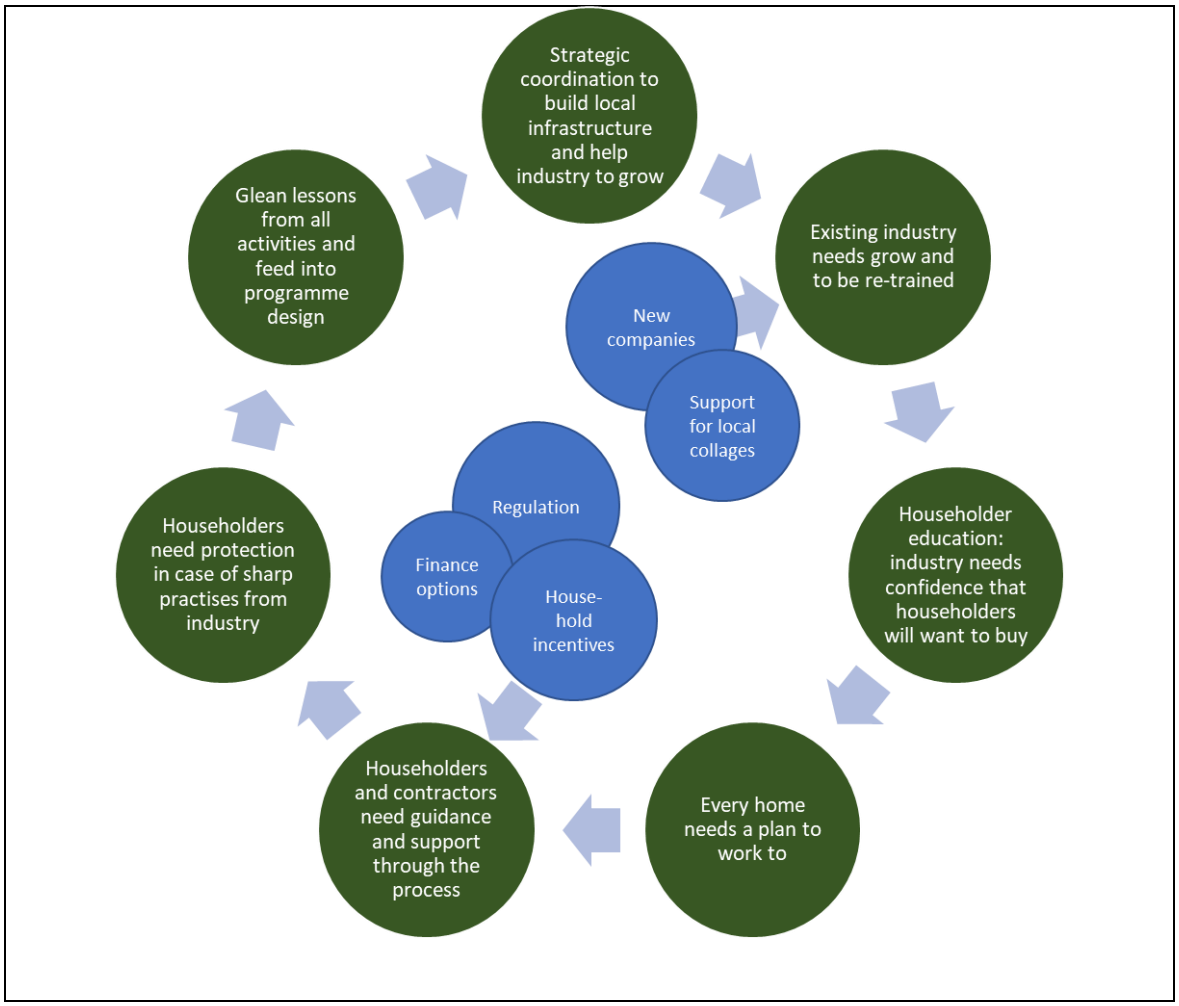
WHY INTERVENTION IS REQUIRED

For the UK to meet its legally embedded net zero carbon emission targes by 2050, we need to decarbonise the economy. A key part of this is through retrofitting the domestic housing stock to make it more energy efficient, including changing the way in which we heat our homes to low carbon technologies. Current government funding is predominantly focussed on supporting vulnerable, low income or fuel poor households meaning most households will need to self-fund this work. Owing to the scale of this challenge, strategic intervention across all tenures is required to put the building blocks in place for this market to grow to meet the needs of households across the UK. In the Cheshire and Warrington sub-region the three local authorities have more ambitious dates for decarbonisation making the challenge even greater in the sub-region.

Some might argue that some policy nudges would suffice to unlock the retrofit market, and that the market will adapt and mature to grow into the demand and that the demand for domestic retrofit that will automatically be there. The speed and accuracy with which we need to move means that position means further action is required. Here are the practical reasons why this is the case:

- Some strategic coordination is needed to ensure that the critical infrastructure need to support industry is achieved without stutter and duplication of effort.
- Existing industry needs to be re-trained to understand the value and techniques.
- The existing industry needs to absorb the number of new entrants, grow quickly and not run into cashflow problems.
- That industry needs confidence that householders will want to buy this work before they commit to training.
- Therefore, householders need to understand that this is an inevitable activity, best carried out over a period of years as other works are undertaken. They need to understand the benefits of action and be incentivised to take action.
- Each home will need some coordination as the retrofit industry typically works in silos and additional re-work costs can be avoided.
- To take action they need a plan to work to, one that they and their contractors understand.
- Once there is that engagement, the householder and contractor both need support to execute.
- Lessons must be drawn from all activities on an ongoing basis to understand the lessons and pass onto the scheme managers.

Figure 2.1 Key tactical components of a supported retrofit market transformation



There are currently no indications from central government that any scheme to deliver these tactical interventions is in development. It would be welcome if this position did change, but C&W LEP needs to plan for driving it without additional support to drive uptake before any potential national scheme is rolled out.

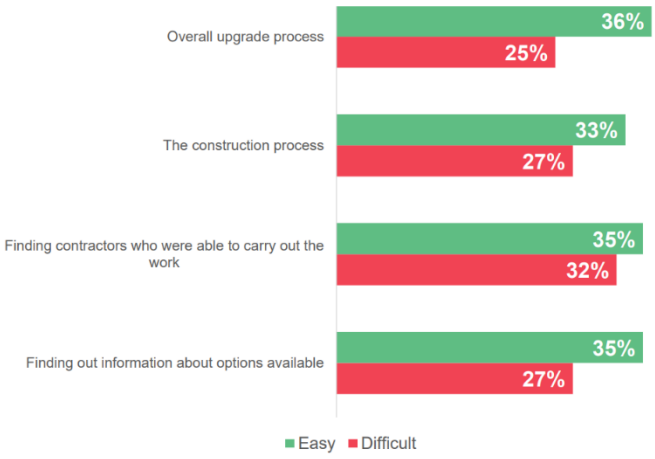
The Grenfell Tower Fire was one of the worst disasters of modern times, leaving 71 people dead and hundreds homeless. As part of the Government's response to the Fire, the then Home Secretary commissioned Dame Judith Hackitt to undertake an independent review of Building Regulations and in particular their impact on Fire Safety. Parallels can be drawn between the barriers to retrofit progress and the industry failings identified by Dame Hackett. Specifically:

- the roles and responsibilities of those procuring, designing, constructing and maintaining buildings are unclear;
- the package of regulations and guidance can be ambiguous and inconsistent;
- the processes that drive compliance with building safety requirements are weak and complex with poor record keeping and change control in too many cases;
- competence across the system is patchy;
- the product testing, labelling and marketing regime is opaque and insufficient; and
- the voices of residents often goes unheard, even when safety issues are identified.

Industry needs clarity and support and some regulation to move with the speed and accuracy outlined earlier.

Ipsos Mori surveyed 1,012 homeowners and landlords who have made green improvements in the UK in June 2021. The graph opposite indicates that assistance in a structured way is needed, and the report concluded that there is high interest in sustainability but homeowners worry about cost and tend to think they are doing enough already. There is therefore an educational piece of work to be done.

Figure 2.1: Ipsos Mori research into household attitudes to sustainability



The Cosy Homes Oxfordshire scheme is discussed in more detail later, however, to note at this stage, since its launch in 2019 there have been too many customers coming forward for the scheme to handle. The demand for the offer is significant, the ability of the local industry to cope is lagging. Customers really do want to retrofit but routes to delivery are needed to make that happen.

The market will not evolve on its own. It needs leadership to bring parties together.

THE NATIONAL CONTEXT

Policy Context

Achieving a 'Net Zero' performance in all areas of the economy by 2050 is our collective, legally-binding target set down in UK law.

In October 2021, the UK Government's Department for Energy Security and Net Zero (DESNZ) formerly the Department of Business, Energy & Industrial Strategy (BEIS) launched its Heat and Buildings Strategy[2] seeking to set out how the UK will decarbonise homes and commercial, industrial and public sector buildings, as part of setting a path to net zero by 2050. The paper sought to significantly cut carbon emissions from the UK's 30 million homes and workplaces in a simple, low-cost and green way whilst ensuring this remains affordable and fair for households across the country.

The Government are yet to publish details of exactly how they will achieve all of the ambitions set out in the strategy. Recent announcements have delayed the existing high level deadlines for the ban on fossil fuel boilers in off gas grid properties and tightened energy efficiency standards for the private rented sector. Specific areas in which the Government have provided direction is through indicating they wish to improve EPC standards for the social landlord sector and a high-level ambition for the ban on the installation of all types fossil fuel boilers in 2035, all be it with an expected exemption for around 20% of all domestic properties.

They have also indicated an intention to move the levies applied to fuel bills to fund renewable generation/ energy efficiency schemes from electricity tariffs to the ones charged for gas.[3] This would lower the tariff for electricity meaning heat pumps become cheaper to operate/ are far more cost competitive with gas boilers. At the time of writing there was not a timeline for when this rebalancing will be brought in.

The Government's future infrastructure advisory body, the National Infrastructure Commission highlighted the need for more central strategic direction for the decarbonisation of housing in their latest National Infrastructure Assessment.[4] In particular they highlighted heat pumps as the most

efficient technology for decarbonising domestic heat, with Hydrogen only being expected to have a limited role in the future heat mix. To achieve this, they propose the Government should set out long term funding, with increased incentives/ low interest finance options for households to decarbonise heat and Energy Efficiency programmes. They should also resolve the current uncertainty around the role of Hydrogen to provide industry/ households with clarity. The key theme throughout the report is that to meet net zero, the UK needs to adept a 'Pace not perfection' approach in order to make the rapid progress required. The UK Government are yet to respond to these recommendations.

The challenge set out above needs to be tackled and the further into the future it is commenced, the more expensive it will be to undertake due to the hard deadline the UK/sub-region are facing and the and the intensity needed to get there.

Government Funding

The Government has provided funding for retrofit, it has predominantly been targeted at supporting households in or at risk of entering fuel poverty through schemes such as the Green Homes Grant Local Authority Delivery (LAD), the Home Upgrade Grant (HUG), Energy Company Obligation (ECO4) and the Social Housing Decarbonisation Fund (SHDF). These schemes target properties with the worst EPCs to make them more energy efficient for the resident. Owing to the focus of these schemes on fuel poverty, the vast majority of UK households are currently required to self-fund the retrofit of their property.

The Government have also recently launched the Great British Insulation Scheme (GBIS), formerly ECO+ which provides funding for singular insulation measures such as loft/ cavity wall insulation for both households which qualify for the standard ECO scheme as well as properties within council tax bands A-D.

There is funding available for all households for the installation of low carbon heating system such as Air/ Ground Source Heat Pumps and to a lesser extent, Biomass Boilers through the Boiler Upgrade Scheme. This scheme provides up front funding of £7,500 for heat pumps and £5,000 for Biomass Boilers. Whilst there has been a recent uplift in the number of applications following an increase to the amount provided for heat pumps,[5] general uptake for this scheme has been below the level forecast by the Government.

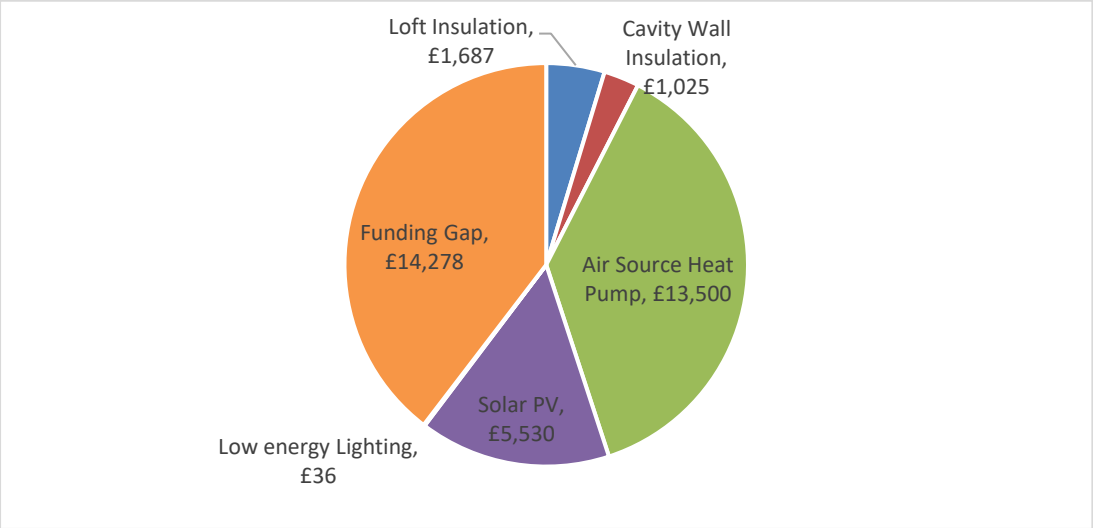
Funding has also been made available for the development of Low Carbon Heat Networks through both the Heat Network Delivery Unit and the Green Heat Network Fund. These schemes provide funding for the development of heat networks utilising low carbon heat sources such as Ground Source Heat Pumps.

Finally, the Government have also provided funding for retrofit skills training, area based retrofit pilots/ community group engagement approaches and the development of Green Finance offerings. The learning/ outputs of these programmes are referred to in other sections of this report. There have also been indications that further funding announcements will be made in 2024.

Examples of individual household funding options in Cheshire and Warrington

To illustrate the potential impact of government grants at an individual household level, we have modelled spending profiles for two properties, one which is an owner-occupied property which can access the Boiler Upgrade Scheme to contribute to the cost of a heat pump. As this scheme is currently scheduled to end in March 2025 only a limited number of households in the sub-region are likely to utilise the scheme.

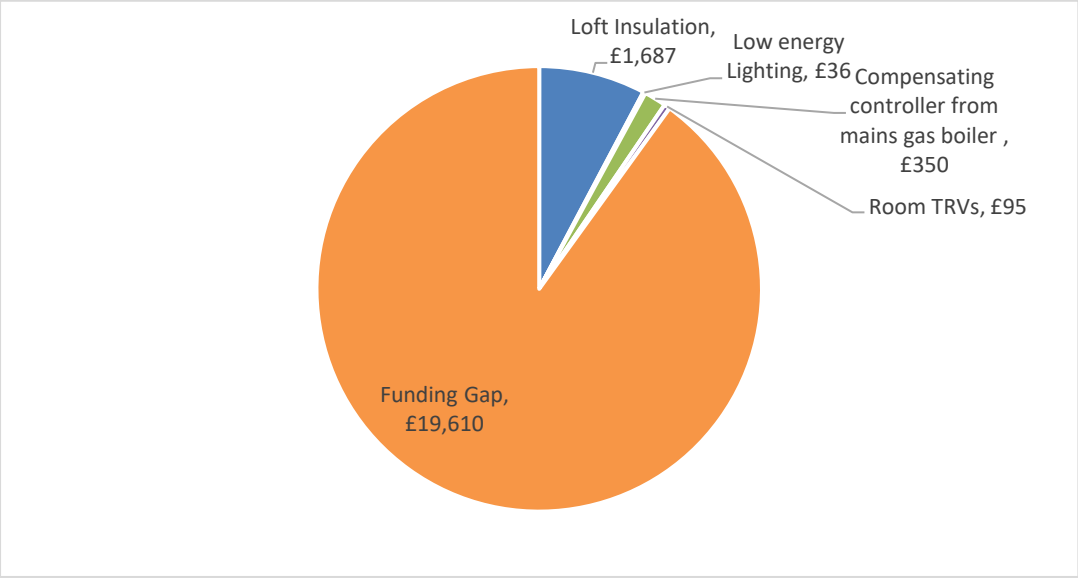
Figure 2.2 Breakdown of total retrofit costs for owner occupied property not eligible for government low income/ fuel poverty schemes



This household would see an economic payback through reduced fuel bills after 14 years. This payback period would be reduced if the tariffs applied to electricity tariffs are removed/ transferred to gas as outlined in the section above and thus the costs of heating the home with the heat pump are reduced.

The second scenario is if the same property was owned by a social landlord who could access government funding to upgrade the property to an EPC C standard.

Figure 2.3 Breakdown of costs for social housing qualifying for government support



As the savings would fall to the household, there is no economic payback for the social landlord. However, they will receive a range of other benefits such as a reduction in the likelihood of rent arrears as a result of their tenant's savings.

A summary of our proposal of the decisions Government needs to make in order to facilitate the decarbonisation of the housing stock across the UK is included in section 4 below.

A NATIONAL RETROFIT STRATEGY?

The National Retrofit Strategy[6] was written by Parity Projects on behalf of the Construction Leadership Council. The main premise of the work was that industry will be able to deliver a national retrofit programme, but there are critical elements that can only be delivered by the Government. While industry can mobilise the majority of the capital that is needed, the Government must also invest to instil confidence in the sector.

The industry needs around 500,000 new professionals and trades to tackle this challenge. We also need to upskill our existing workforce. The Government has supported the development of new training standards for Retrofit Coordinator and Retrofit Installer as part of the PAS2035 accreditation scheme, which can form the basis of the programme in terms of training and quality assurance. Clarity on standards, process requirements and audit will provide a firm foundation for both training and market transformation.

The report identified a critical element of a National Retrofit Programme called 'Interlocking Components' and this is reflected on the success of a local one-stop-shop too. If any one of the components is taken away from a programme, the whole model will fail. Some of these should be nationally led (e.g. Performance standard, Leadership and Communications) but all could be delivered locally too. The financial model for a C&W LEP level retrofit offering considers the need to build each of these components where they do not yet exist in the region, or where central Government is not seeking to fill the gap.

THE LOCAL CONTEXT

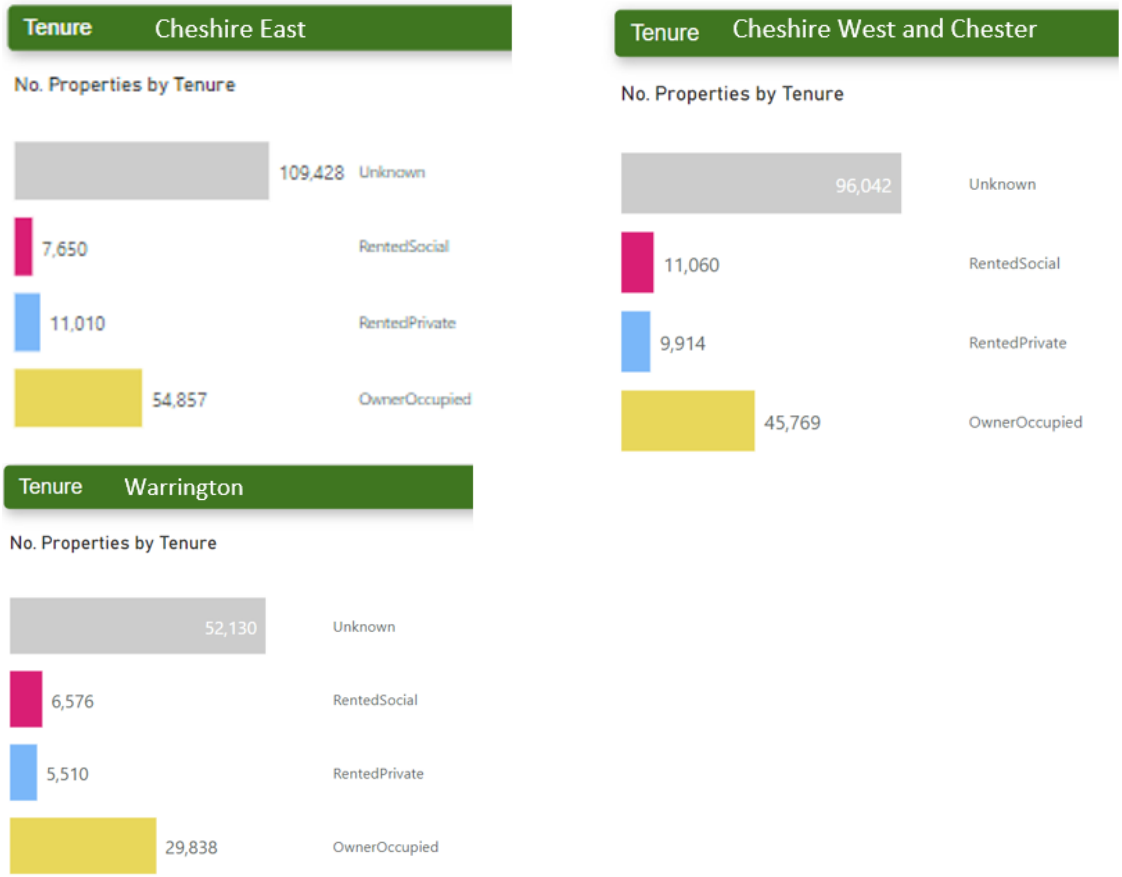
Local Authorities

The three local authorities in the region have set their own dates for their regions to become Carbon Neutral/ reach Net Zero ahead of the national deadline:

- 2041 Warrington (Net Zero)
- 2045 Cheshire East (Carbon Neutral)
- 2045 Cheshire West and Chester (Carbon Neutral)

Below is a summary of the different tenure types within the region:[2]

Figure 2.2 Property Tenure in the Sub-Region



To meet their deadlines, the local authorities have set out a number of interim steps in various action plans to outline how they intend to support residents retrofit their properties or shape future behaviour change.

The three local authorities have participated in the various government retrofit funding schemes referred to above to retrofit fuel poor properties, working with stakeholders such as social landlords to lead coordinated bids.

Retrofit also has a role to play in the delivery of the three local authorities place based plans/ programmes to improve the health and outcomes for residents through helping to improve living

[2] The large number of unknown tenure types is due to the Pathways analysis using EPCs as the source for its modelling of the housing stock. Where an EPC is not available and the platform clones a neighbouring property, the tenure type is listed as unknown to avoid providing incorrect outputs.

conditions within their areas[7,8,9].These plans are due to end in 2024 so it is important that the Local Authorities work at a cross organisational level to ensure retrofit can be embedded within subsequent schemes.

Any retrofit offering for the Chester and Warrington region needs to ensure it aligns with both the national and regional targets for both carbon reduction and improving resident outcomes, providing certainty to industry and residents as they consider their future investment decisions.

THE LEVEL OF AMBITION

The current rate of domestic energy focused retrofit in the Cheshire and Warrington sub-region is low and is insufficient to meet the legally binding CO_2 emission reduction targets set by the UK central government and the three local authorities. With this in mind, the Cheshire and Warrington LEP is seeking an overview of the options available to them that will enable renovation of all existing houses in the region.

Bringing the CO_2 targets together with smart application based on good advice and quality delivery execution should allow the three local authorities, the C&W LEP and NW Net Zero Hub to be suitably ambitious as part of a joined up, strategic partnership. This will enable the programme to engage wider stakeholders through a joined up approach and find potential economies of scale for procurement exercises/ in house administration.

Whilst some of the options being explored in this report are focused on able-to-pay customers, the investment in local infrastructure will underpin an industry capable of supporting fuel poor families. Whilst there are several grant schemes that can be used to pay for works on fuel poor homes, all of theme suffer significantly from the lack of supply chain leaving a lot of money unspent and handed back to Government. Moreover, the estimate of the number of homes in fuel poverty is 47,865. This figure is calculated using Government data from 2021 so the number is likely to be significantly higher at the time of writing. If these households are to be supported locally, there needs to be a mechanism that creates an adequate local supply chain and this needs intervention.

There is significant progress being made on decarbonising the electricity supply system, and this shift from dirty fuels such as coal to renewables is having an impact. But supplying heat to homes is the big untouched problem and reducing the need for it in the first place by efficient heating systems and insulation is the only way to meet this target. On that basis, throughout this report there are references to the fact that every home in each of the local authorities' areas must have been improved if the Net Zero target is to be met. Any initiatives set out here will therefore be compared to the rate at which houses need to be renovated to achieve this overall target.

There are of course many benefits beyond CO_2 reduction, including cost savings, jobs and health benefits and these are set out in Section 4.

3. The multiple benefits of domestic retrofit

RETROFIT PATHWAYS REPORT FOR THE SUB-REGION

As outlined within the separate technical analysis report, we have modelled three decarbonisation routes for the housing stock in the region:

- All homes to a minimum of EPC C:
- All homes to a 'net zero' standard excluding less disruptive fabric measures.
- All homes to a 'net zero' standard including less disruptive fabric measures.

The analysis identifies a potential retrofit market worth between £1.2 billion to £10.1 billion. All of the scenarios include the electrification of heat, predominantly through heat pumps. Whilst the EPC C scenario is in line with the Government's current proposed target for 'as many properties as possible' to reach by 2035[10] results in a significantly lower level of household investment, additional retrofit measures are required to truly decarbonise the housing stock. This could act as a potential stepping stone for the sub-region as is identifies the tactics needed to decarbonise properties which are already ready for a heat pump and which ones need retrofit measures before installation.

The other two scenarios include additional energy efficiency measures to further decarbonise the property. This modelling applies individual low carbon heating systems, such as Air Source Heat Pumps within each property in the sub-region and thus does not include the costs/ potential savings of utilising heat networks in selected areas of high housing density/ close to potential heat sources to decarbonise some of the domestic heating in the region or the heating. However, it does not factor in the potential contribution from government schemes as it is currently not possible to predict the level of government funding into the future when the majority of the properties are likely to be retrofitted.

There are also significant employment opportunities to meet the needs of this market, both creating new jobs and providing new opportunities for existing trades to reskill to utilise their current skill set a breakdown of which is included within Section 6 Skills and Jobs.

Figure 3.1 Overview of EPC C Scenario

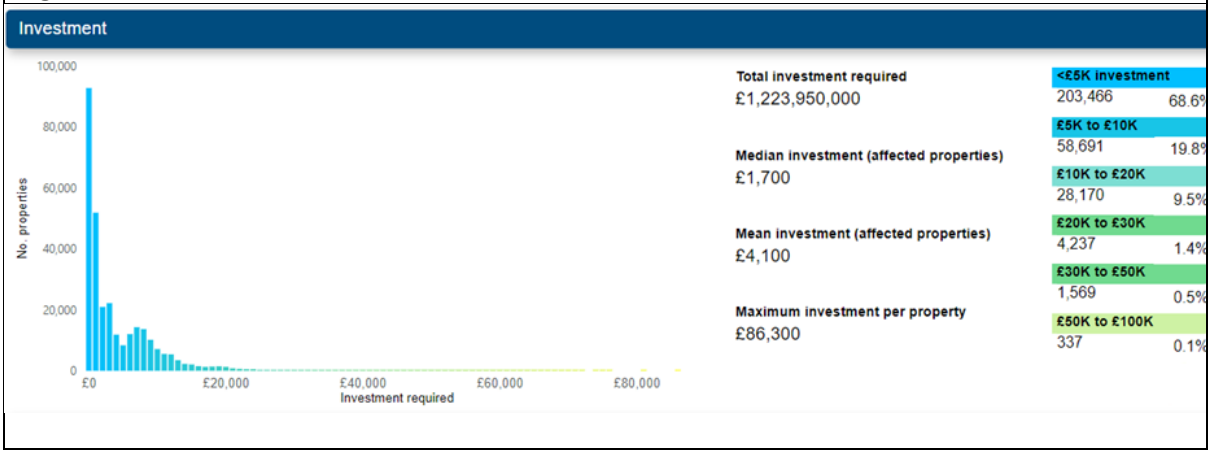


Figure 3.2 Overview of Less Disruptive Scenario

This does not include measures such as internal/ external/ underfloor insulation which most households consider too disruptive to install

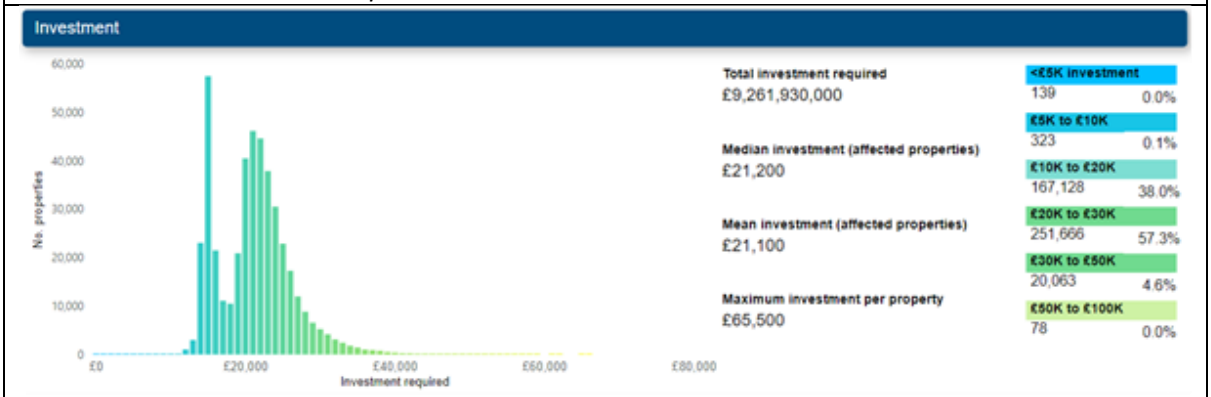
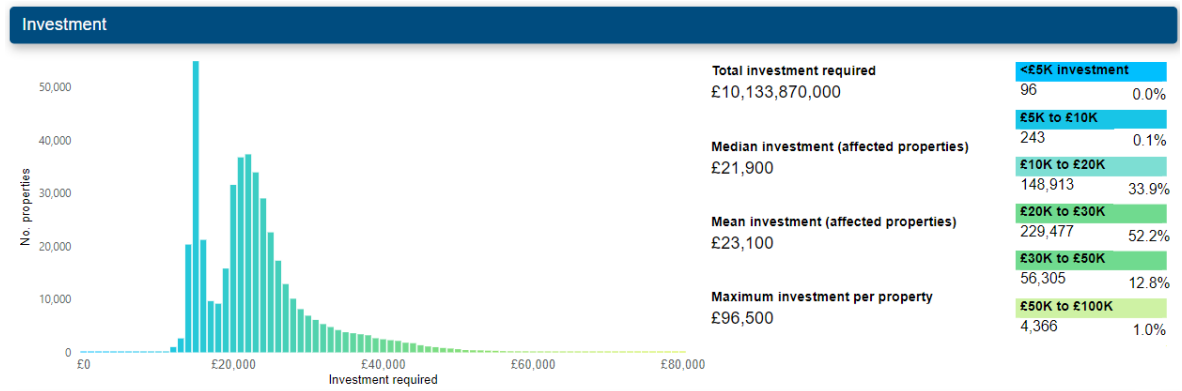


Figure 3.3 All Fabric Scenario

This includes measures which households might consider disruptive



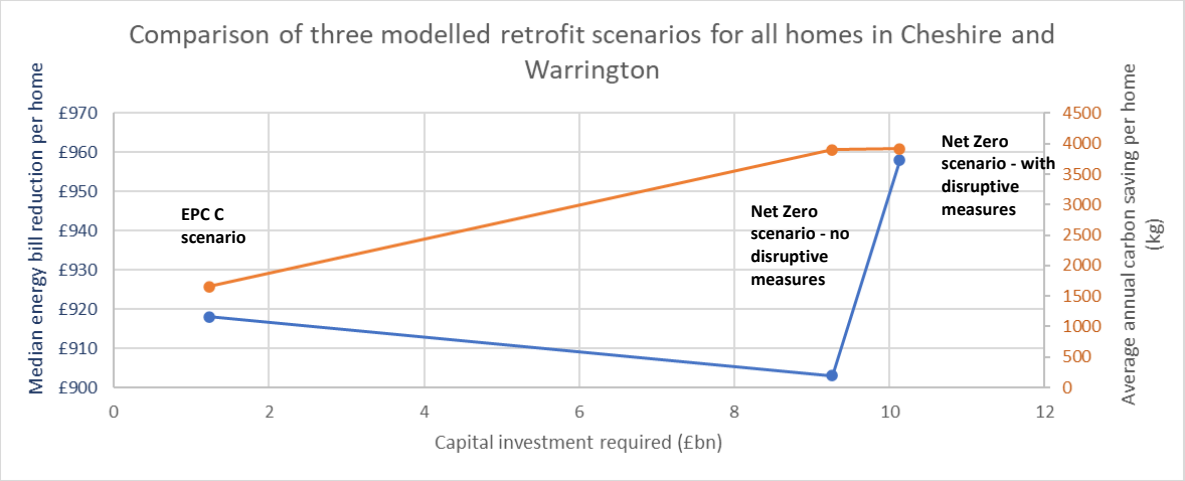
When comparing the scenarios directly in terms of the capital investment required versus the energy bill savings and carbon dioxide emissions reduction, there are some important factors to consider. Figure 3.4 below shows the gradual reduction in CO_2 emissions as the additional measures are applied, albeit that most of the saving is achieve with the EPC C scenario, but the standard being reached with significant additional investment. This highlights the law of diminishing returns which prevails whether you consider one home or 400,000. The EPC C position is a route on the way to the required zero carbon performance, and this comparison shows how critical it is that every home is shown a clear path with expert guidance, so a correct path to zero carbon is selected with no change of technology choices on route that would add to cost considerably.

In addition, one can see the average reduction in energy bill saving for the average home when moving from Scenario 1 to 2 actually increases home energy bills on average. The majority of homes do save energy, but some, when applied to the modelling parameters that do not include the more major insulation measures but do include heat pumps in most homes, means that some homes experience a rise in energy bills. Please see Section 5 and Appendix 3 for an explanation of why this is the case.

This further highlights the need for carefully administered retrofit schemes with professional advisers and not a leap to the contractor driven heat pump programmes that would potentially

avoid the need for insulation. Whilst at this time is that the Boiler Upgrade Scheme does require the insulation recommendations on the EPC to be carried out before the boiler is funded, this will no longer be the case from May 2024. This may lead to inefficient heat pump installations which could cause consumer detriment – such measures are not considered within this report.

Figure 3.4 Comparison of three retrofit scenarios



The above highlights the significant challenge but also the economic opportunity. If this challenge can be turned into a deliverable project, it also offers multiple benefits to the entire sub-region.

THE PACE REQUIRED AND JOBS CREATED

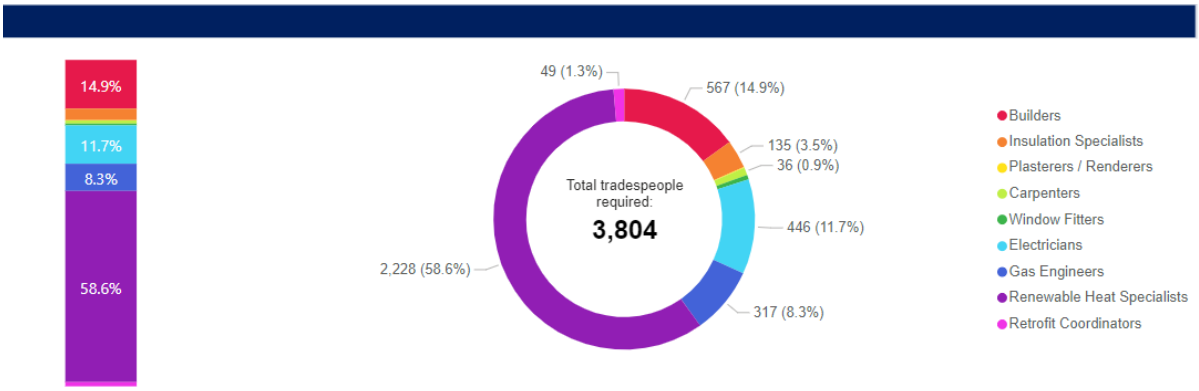
Achieving the decarbonisation of the housing stock within the timeframes set out for net zero by each local authority is a significant challenge, the magnitude of which is outlined below:

Table 3.1 Number of days left for sub-region Local Authorities to decarbonise domestic properties

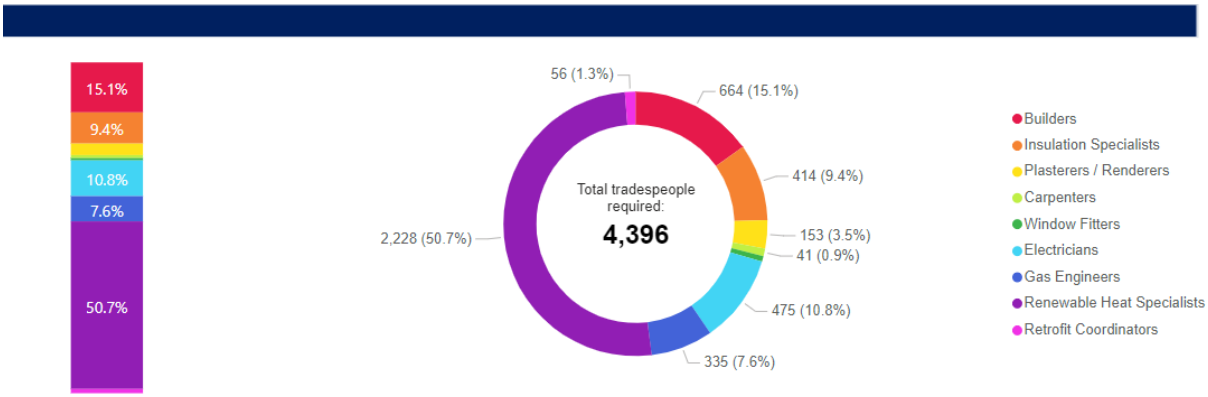
Key Date	Cheshire East	Cheshire West and Chester	Warrington
Decarbonisation date	2045	2045	2041
Houses to tackle	183,169	162,936	94,130
Days remaining if starting on 1st April 2024	7,945	7,945	6,484
Working days remaining (inc. Saturdays)	6,487	6,487	6,365
Completions required per working day	28	25	15
Target completions per year.	8,722	7,759	5,537

The Pathways report highlights the resources needed to do this work. Based on a competition date of 2040, the less disruptive scenario (details outlined above) would require **3,804** trades. These are gross figures, the number of existing workforce working in this space yet to be ascertained.

Figure 3.2 Summary of trade requirements for decarbonisation scenarios



If the disruptive scenario is taken up, then the number of trades required increases to **4,396.**



This presents opportunities to create new jobs for the sub-region and for members of the existing workforce to retrain in order to futureproof their career.

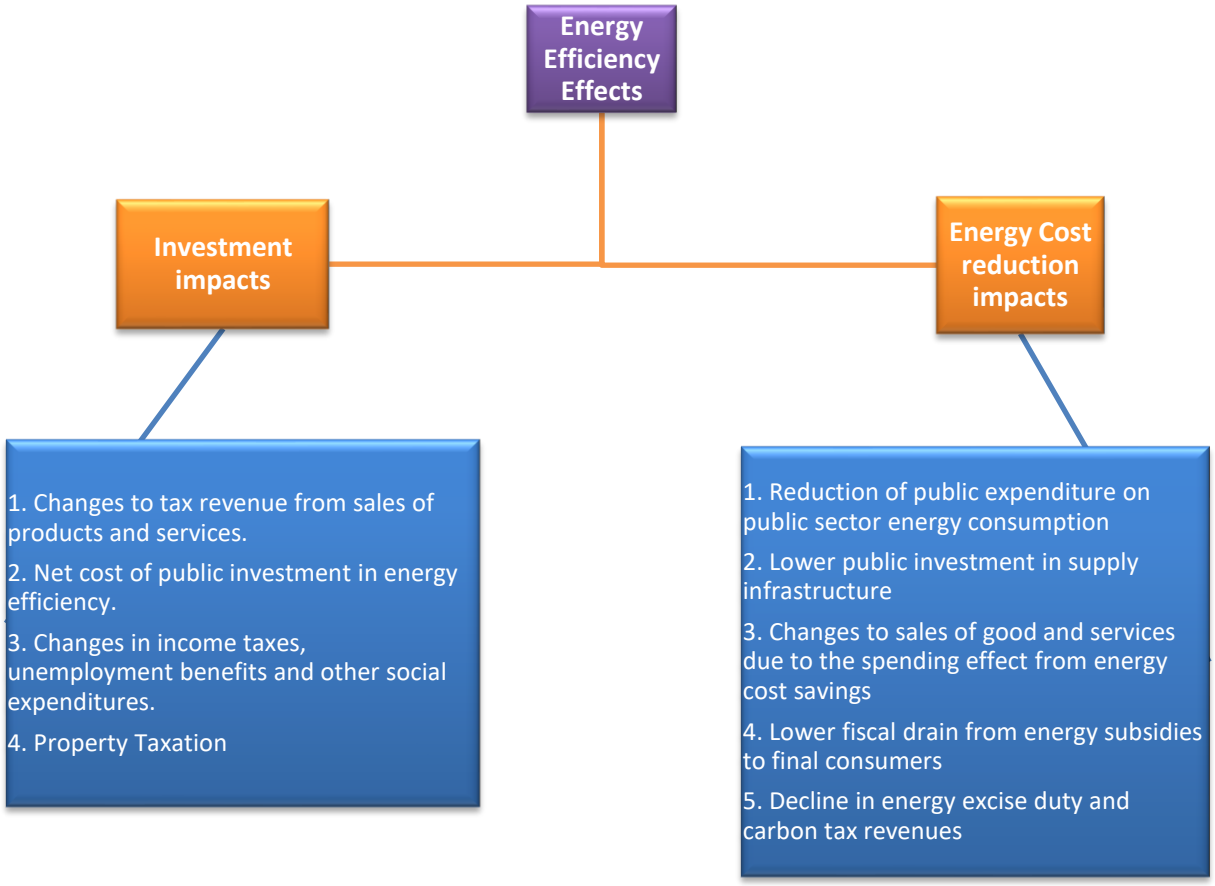
The mix between new and existing workers was highlighted within the Cheshire and Warrington LEP's Skills Report,[11] which found that retrofit and heat pump installation will be a particular challenge for the sub-region.

To develop a further understanding of the retrofit skills requirement for the sub-region, the North West Net Zero Hub have commissioned a separate skills study which will be published after this study has been completed.

BEYOND ENERGY BILLS AND DECARBONISATION

Successive studies have shown that energy efficiency offers the most cost-effective options for meeting global emission targets. In many cases, energy efficiency measures have been shown to be 'negative cost', meaning that it would be economically advantageous to implement them.

Figure 3.3 Capturing the multiple benefits of energy efficiency



The IEA's authoritative report 'Capturing the multiple benefits of energy efficiency' (IEA, 2014) shows that the potential benefits from improved energy efficiency are not only socio-economic but could help to address a range of political, social, economic and environmental issues. These were divided these benefits into six impact areas:

- Economy and labour market
- Health and Wellbeing
- Environmental impact
- Social aspects
- Public Budgets
- The value of buildings

ECONOMY AND LABOUR MARKET

The key relationships are:

- An increase in investment will boost rates of economic activity and create jobs.
- A reduction in imported energy may be replaced with additional spending on goods and services that are produced domestically, which is good for the wider economy.

In general, an improvement in energy efficiency could be expected to lead the economy to being less exposed to shocks in energy supply, therefore improving energy security in response to global events.

Our analysis of the jobs and economic benefits retrofit can provide in the region is summarised above. It is important to note that a lot of the jobs outlined within the analysis can be filled through upskilling the existing workforce rather than simply creating new jobs.

In 2019, the Local Industrial Strategy Evidence and Insight Summary was created by Cheshire and Warrington LEP.[12] This report includes work on productivity and the business base. The LIS is complementary to the Strategic Economic Plan and Prospectus for Inclusive Growth, setting out areas of focus that will support productive growth in the economy. The thrust is, "we have the potential to lead the UK in the second Clean Growth Grand Challenge mission: establishing the world's first net-zero carbon industrial cluster by 2040 and at least one low-carbon cluster by 2030".

Domestic retrofit or domestic energy is not cited in the report, but co-joined initiatives are:

- "**AI and data** will put the UK at the forefront of the AI and data revolution…."
- "**The ageing society** Grand Challenge aims to harness the power of innovation to meet the needs of an ageing society. This will ensure that people can enjoy at least five years of healthy life by 2035, whilst narrowing the gap between rich and poor. Given our demographics this is a Grand Challenge mission where our older population can possibly both input to and benefit from."
- "Through the future of mobility Grand Challenge, the UK will become a world leader in the way people, goods and services move, by designing and manufacturing **zero emission vehicles** (EVs). There are opportunities for Cheshire and Warrington through the expertise embedded in the region on **the impact of EV's on local energy networks**."

The report also provides an overview of industrial sectors on the sub-region:

Table 3.2 Productivity by broad sector group (2012-17)

Broad sector group	Cheshire and Warrington		GB	
	GVA per job (2017)	GVA per job growth (2012-17)	GVA per job (2017)	GVA per job growth (2012-17)
Real estate	£367,778	-24.2%	£447,660	3.3%
Manufacturing	£171,756	7.2%	£73,334	11.1%
Finance and insurance	£104,103	10.8%	£122,472	1.3%
Information and communication	£78,057	-16.4%	£89,036	-6.3%
Primary industries and energy, waste and water	£71,669	-58.4%	£75,424	12.8%
Construction	£68,875	16.6%	£72,317	1.5%
Other services	£40,711	-13.4%	£49,005	5.8%
Transportation and storage	£40,520	-2.6%	£52,903	-0.2%
Administrative and support services	£39,495	29.7%	£31,924	1.2%
Professional, scientific and technical activities	£35,292	-29.0%	£52,580	-0.3%
Public services	£34,085	-3.6%	£39,336	-1.6%
Retail and hospitality	£33,701	11.7%	£34,806	5.1%

If retrofit is to provide a significant economic boost to the region it could be provided in two ways:

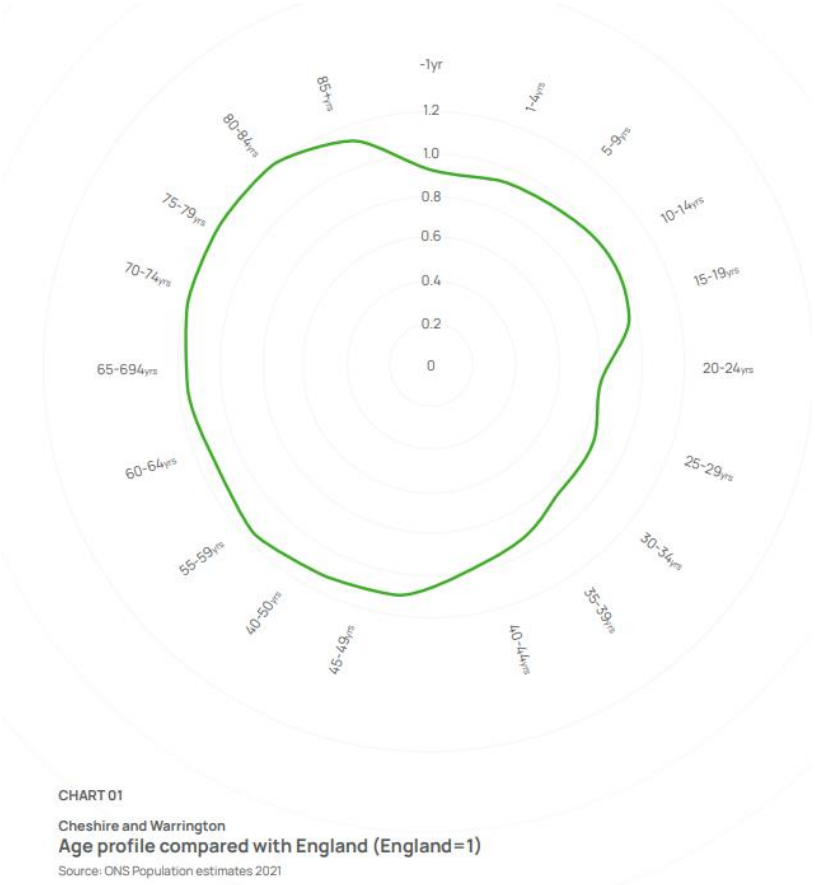
1. It could 'bootstrap' the infrastructure and personnel to drive a local market for itself.
2. It could adopt a leadership position and develop the expertise, skills and tools to export to the wider region and beyond.

Many of the sectors noted in the table extract above that are on the wane such as 'real estate' and primary industries', which have significantly aligned skills amongst the personnel working in them and retraining to work in the retrofit challenge would not be onerous.

AGEING POPULATIONS

The 2021 Census highlighted both Cheshire East (22%) and Cheshire West and Chester (21%) have a slightly higher proportion of the population over 65 than the national average (19%)[13] whereas Warrington has a lower proportion (14%). Applied across the whole sub-region the demographic is summarised in this chart taken from below is taken from the Cheshire and Warrington Skills Report 2022:[14]

Figure 3.4 Age profile of Cheshire and Warrington compared with England



The UK population as a whole is aging, meaning any retrofit offerings need to consider how best to appeal to these older demographics. Whilst analysis of the Government's ECO energy efficiency grant scheme found the households receiving measures tended to be older[15], other research has found that older households have a lower level of understanding of the benefits of retrofit/ appetite to commission retrofit.

The aging population also has a knock-on effect on the supply chain. The 2021 census found that under a third of the workforce in the Cheshire and Warrington area are under 35 and this increases the challenges of the incentivising the existing supply chain to reskill as typically they are well established in their trades.

Older people are prone to fuel poverty, especially those who live in larger, older and less energy efficient properties. These households will need to be proactively engaged-with to ensure they can receive the support they require through the government retrofit schemes if applicable.

HEALTH AND WELL-BEING

It is incredibly important to understand that householders of all types underheat their homes, or have areas of their building which may affect their health for other reasons.

There is a groundswell of evidence showing that whether or not a household feels able to afford to keep its home warm significantly affects health and wellbeing status, with considerable social and emotional burdens experienced by those struggling to pay their fuel bills.[16]

Living in a cold damp home is a significant contributing factor to a number of health conditions. Research conducted by Baringa Partners from Citizen's Advice[17] found upgrading 13 million domestic properties to an EPC C had the potential to save the NHS £2 billion through avoided treatment costs for both physical and mental health:

- £757 million - Stroke
- £530 million - Coronary heart disease
- £525 million - Adult mental health
- £51 million - Youth mental health
- £82 million - Asthma
- £35 million - Other respiratory

The nature of many of the above also means retrofitting these properties has the potential to reduce patient numbers during the winter peak by up to 30%.

This is in line with research conducted by The Building Research Establishment (BRE)[18] which produced similar findings, calculating that reducing hazards in housing including cold could deliver £600 million of savings per annum for the NHS and an influential report from 2008 showed that for every £1 spent on fuel poverty prevention there is a 42 pence saving in NHS health costs.[19]

Based on this, creating targeted retrofit plans for areas support the targeting of areas in each borough where impact on health can be achieved to maximum effect, whether this is when carrying out a marketing campaign or focusing internal resource at the local authority in departments such as adult social care to find residents most in need.

The Citizens Advice report also found that upgrading these properties to an EPC C by 2030 would potentially prevent up to 6,000 excess deaths, generating socio economic benefits of around £6.6. billion to the UK. Taking forward any statistics for modelling a wider scheme that covers a wider range of customer types is therefore not possible, so wider assumptions are needed.

Other research shows that interventions targeting at-risk populations provided clearer health benefits than area-based programmes[20]. Successful programmes studies were area-based, but they did focus on communities at risk of fuel poverty, in areas of high levels of deprivation and poor quality housing. What is clear is that for health benefits to be realised, there needs to be precision, silo-busting and coordination across stakeholders to ensure these health benefits are made real.

To underpin this, the influential 2015 report produced by National Institute for Health and Care Excellence [21] recommended that a local single-point-of-contact health and housing referral service should be commissioned to help vulnerable people who live in cold homes. In addition that, "*Health and wellbeing boards and their partners should ensure the local single-point-of-contact health and*

housing referral service provides access to tailored solutions to address identified needs, rather than an off-the-shelf approach. Solutions should take into account the language and reading ability of recipients, including any vision or hearing problems. Solutions should include housing insulation and heating improvement programmes and grants. Programmes should be led, or endorsed, by the local authority."

Properly designed actions for improving building energy performance can have major co-benefits for public health, although there are risks involved with the possibility of poorly designed interventions leading to unintended consequences, such as health problems related to ventilation reduction. Most energy efficiency measures will improve indoor temperatures and, by choosing renovation measures that also improve indoor air quality, health benefits can be obtained through fewer incidences of disease, reduced mortality, improved worker productivity and improved overall quality of life. While most of these benefits accrue to society in general, public budgets may also be improved through reduced healthcare expenses, fewer sick days and increased tax revenues resulting from increased economic production.

Europeans spend on average over 90% of their time indoors – at home, in the office, in school, etc. Concentrations of indoor pollutants are therefore an important factor in air pollution exposure and associated health effects.

To measure and quantify the major positive and negative impacts of improved energy performance of buildings, there needs to be a focus on the following issues that particularly affect public health:

- temperatures and ability to keep homes adequately warm, that are directly related to energy efficiency improvements in buildings.
- air tightness levels that are generally increased through energy efficiency improvements, and adequate ventilation which needs to be considered cautiously when setting energy efficiency requirements.
- indoor air quality, resulting from the concentration of major indoor air pollutants (VOC pollutants such as benzene, radon, carbon monoxide, NOx): indoor air quality strongly depends on energy efficiency, even if the links can be either positive or negative, depending on the ventilation level resulting from the efficiency improvements.
- mould and dampness, generally resulting from the temperature level and the ventilation level of the building.
- indoor lighting, which is in most cases improved thanks to energy efficiency improvements, and has major impacts on occupants' health and well-being.
- There are secondary issues related to all of the above such as educational attainment which are not addressed in this work.

Excess Winter Deaths

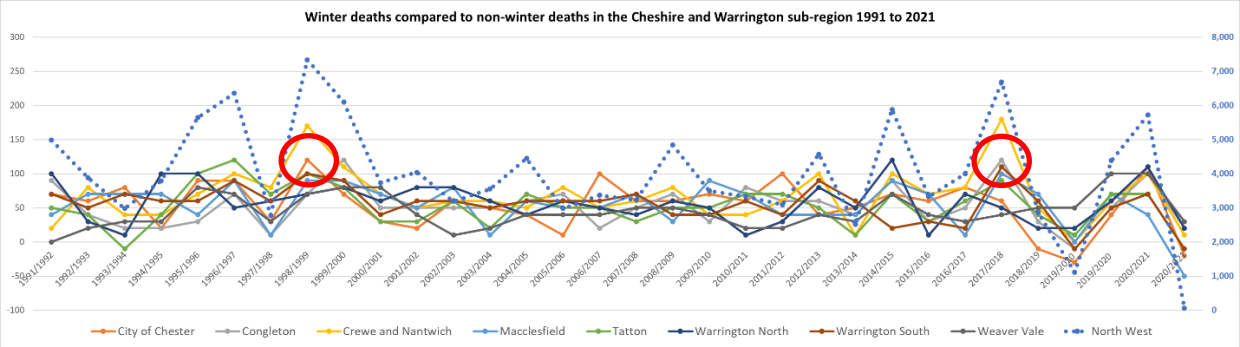
A strong indicator of poor performing homes is the susceptibility of the stock to winter weather, and the Office on National Statistics (ONS) provided statistics on excess winter deaths. In 2017 to 2018 the UK experienced the highest recorded since the winter of 1975 to 1976, in which there were an estimated 58,100 excess winter deaths (EWD) in England and Wales. However, the increase in EWD was similar to peaks observed in previous years such as 2014 to 2015, 1999 to 2000 and 1998 to 1999.

In general, the excess winter mortality (EWM) index can point to the three leading causes of death: circulatory diseases, respiratory diseases and dementia & Alzheimer's disease. Respiratory diseases remain the most prominent underlying cause of excess winter deaths (EWD) with 84.9% more respiratory deaths in the winter months compared with the non-winter months in 2017 to 2018. This equates to 17,400 EWD caused by respiratory diseases and accounted for 34.7% of all EWD. Of these excess respiratory deaths, pneumonia and chronic obstructive pulmonary diseases accounted for the

largest proportions. The prominence of pneumonia is likely related to the relationship between EWM and a range of bacterial and viral respiratory pathogens including influenza.

The graphic below points to parts of the sub-region that could be the recipient of a more focused trials:

Figure 3.5 Winter deaths compared to non-winter deaths in the Cheshire and Warrington sub-region 1991-2021



The two red circles highlighting two spikes in Crewe and Nantwich of disproportionate EWD to other areas, but in line with the regional spike. A focus on this area with a fuel poverty focused pilot project is likely to have the greatest impact whilst reflecting lessons across the sub-region.

As the UK climate continues to change and extreme heat events become more prevalent, the rates of associated morbidity and mortality will also increase. Improving the quality of housing means Cheshire and Warrington residents will have access to homes which are warm and affordable to heat in the winter and cool and well-ventilated in the summer.

Air Quality

In September 2023, the Parliamentary Office of Science and Technology (POST) produced a briefing for MPs on Indoor Air quality[22] which is a good reference for the issue.

Indoor pollutant sources include building materials, cooking and heating appliances, consumer products, occupant activities, damp and mould, and the land on which buildings are sited. Concentrations of certain pollutants are higher indoors and can be exacerbated by poor ventilation. Indoor pollutant concentrations are also affected by the infiltration of air from outdoors.

There is strong evidence for associations between certain individual pollutants and overall poor air quality, with an increased risk of respiratory and cardiovascular illness, cognitive impairment and certain cancers. These health effects of ambient air pollution in general are also well documented and were highlighted in the recent Chief Medical Officer's Report 2022.[23]

Health effects identified in studies focused on high-income countries include:

- short term (acute) health effects associated with indoor pollutants:
    - respiratory infection
    - from mould and from bacteria and viruses such as SARS-CoV-2.1
    - respiratory infection symptoms - from low level CO
    - neurological symptoms and death – from high level CO
    - irritation of the upper airways
    - from formaldehyde

- Long-term (chronic) health effects associated with indoor pollutants:

- asthma – from some VOCs, formaldehyde, NO_2 and gas cooking, mould and bioaerosols.
- allergic rhinitis – from microbial aerosols and mould.
- coughing – from mould
- wheezing – from VOCs, mould and microbial aerosols.
- cognitive impairment – indicated by CO_2
- cancers – lung and childhood leukaemia from radon, mesothelioma from asbestos and multiple sites for ETS

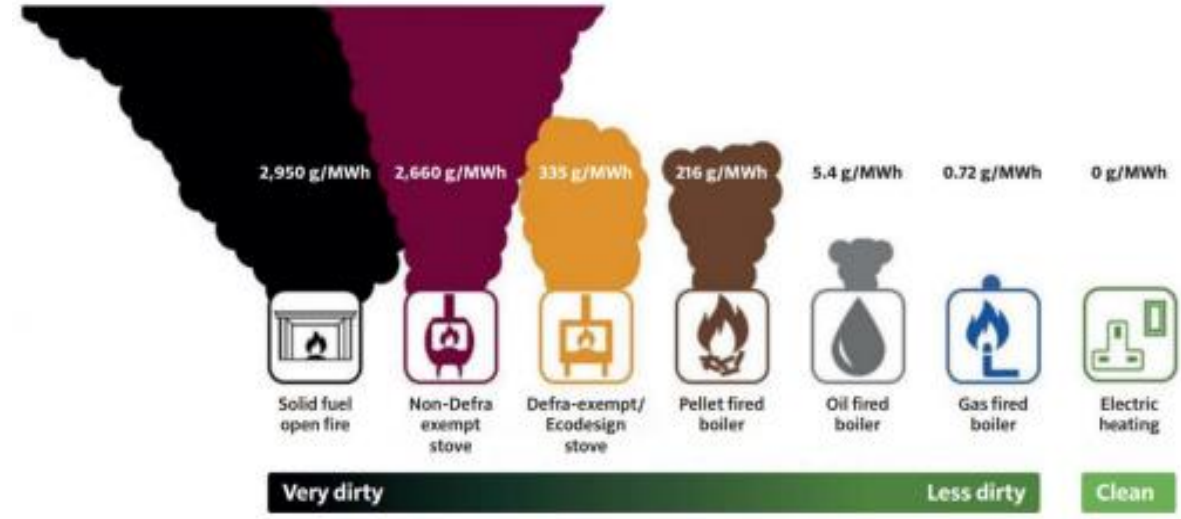
Such conditions are much more likely to occur in privately rented homes, studies have indicated this may be as common as 10% of homes. Children are particularly vulnerable as a consequence of having less developed organ systems, particularly the lungs, increased breathing rates and thus a greater intake of air and pollution into the lung.

Poor indoor air quality and ventilation rates have been linked with more sick days in schools and workplaces, resulting in lower economic productivity and attainment in school due to absence. The European Public Health Alliance (EPHA) estimates the total health related social costs (including loss of work and hospital admissions) due to heating and cooking in the UK to be £2.2 billion per year, of which 40% is from wood burning. In addition, specific public health costs related to cooking with gas are estimated to be at least £1.4 billion per year.

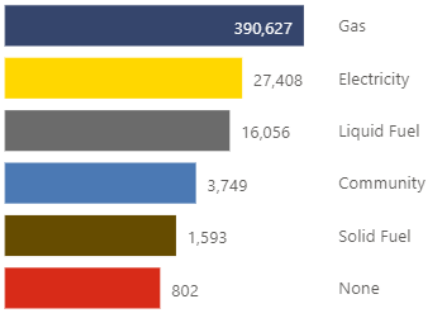
A 2022 report by the Royal Academy of Engineering's National Engineering Policy Centre (NEPC) highlighted the importance of good ventilation as a measure to mitigate the impacts of disease mediated by airborne mechanisms and prevent potential high economic and societal costs of a future pandemic. The COVID-19 pandemic highlighted the importance of good indoor air quality and ventilation to promote infection-resilient environments.

All of the above points to the need for a considered in the local context. The table identifies the particulates that directly impact health and then from the technical analysis, we have extracted the heating fuels for the sub-region:

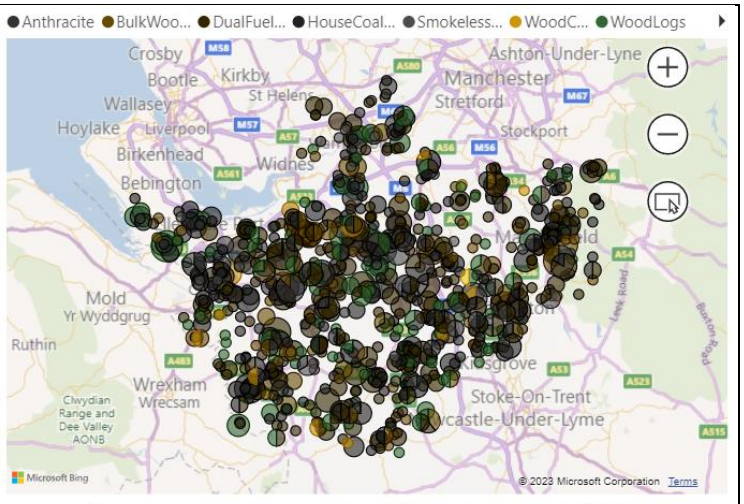
Figure 3. 6 The impact of fuel choice on indoor air quality in g/MWh



Source: Chief Medical Officer's Report, 2022[1]



Fuels to heat homes in Cheshire and Warrington, 2023 (log scale)



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Home heated by solid fuels are spread across the sub-region

In general, the work carried out to marry retrofit activity to health benefits has been keenly sought for some time. There are estimates of the costs to the NHS of treating illnesses which are either caused or exacerbated by cold homes. For instance, Age UK[24] estimated that costs were around £1.36 billion per year.

One of the key outcomes of Warm Homes Oldham scheme was to direct future projects to make early contact with NHS to establish any collaboration over data collection for future assessment.[25]

Within the Cheshire and Warrington area, a number of Health and Care Partnerships between Local Authorities and the NHS have been formed which are looking to see how best to strategically collaborate to improve health, public health and social care in the region. In the Cheshire West area, an Interim Strategy for the collaboration has been published which includes how best the collaboration can address fuel poverty in Cheshire and Merseyside.[26]

ENVIRONMENTAL IMPACT

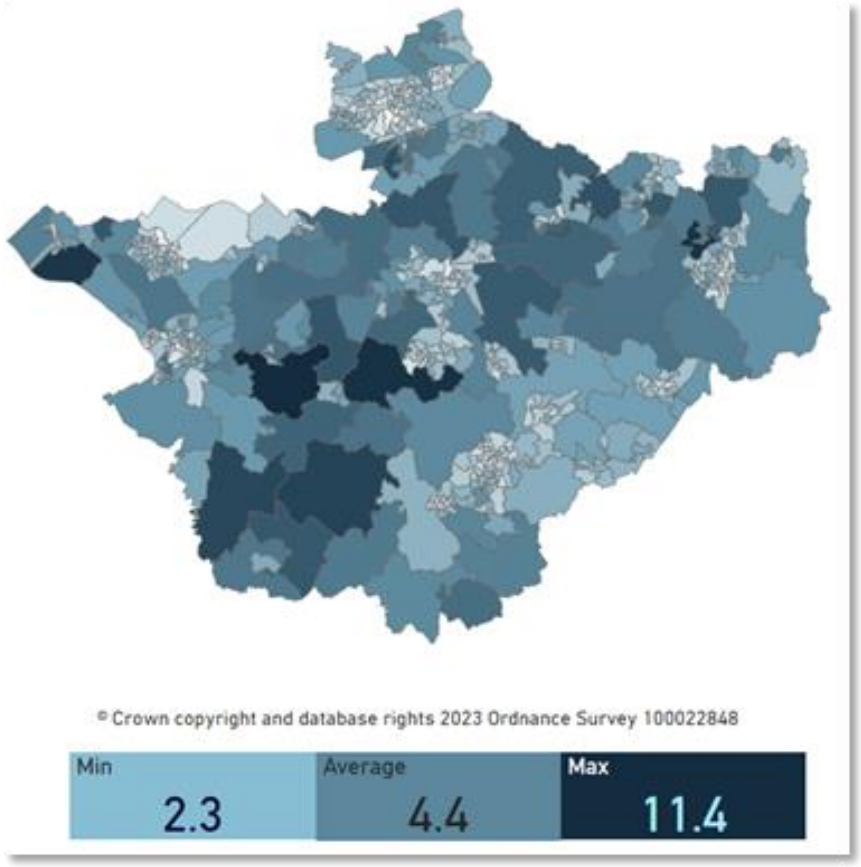
Energy efficiency improvements can positively affect the environment in several different respects. The programme focusses on Carbon Dioxide emissions and the relative reductions from each scheme option. While it is also recognised that embodied CO_2 and use of natural resources are important, they do not form part of this study.

Air quality is affected by energy use, in particular the burning of gas in boilers and biomass appliances in homes. Local authorities should take a strong stance against the growing prevalence of wood burning stoves as a recent study by the National Atmospheric Emissions Inventory revealed that 50% of London's particulate emissions are from these appliances, for instance.

Pathways to a better environment

As part of our modelling of the housing stock in the sub-region we have mapped out the carbon emissions, with the higher concentrations being found in more rural with large/ older properties.

Figure 3.7 Total Domestic Property CO2 per LSOA area in the sub-region



The removal of fossil fuelled boilers/ electrification of heating through retrofit will dramatically reduce the carbon emitted from the housing stock, whilst also improving the air quality through a reduction in the particulates they emit.

SOCIAL ASPECTS

Under this heading we could consider fuel poverty and social inclusion as social impact issues that we need to address. However, the focus is on fuel poverty and the approach is that by addressing fuel poverty there is an impact on social inclusion as a result. By assessing the presence of fuel poor homes in each borough, schemes can be designed to try to help them.

Across the UK there have been trials of innovative place-based approaches to retrofit which sought to engage whole communities to ensure their views and concerns were recognised within the creation of whole area retrofit plans and households were aware of the benefits it could deliver. Examples of this include the Retrofit Balsall Heath scheme which worked from within the community to develop a 'whole place' approach for a region in Birmingham[27], securing funding for the retrofit of 700 owner occupied/ privately rented homes. We look at place-based retrofit as a technique in Section 10.

PUBLIC BUDGETS

The effects of energy efficiency on public budgets are complex (IEA, 2014).

Some examples are:

- Positive impacts on revenues:
    a. Improved ability to pay council tax
    b. Reduced rent arrears.
    c. Potential income for cost centres such as Building Control if providing extra services and advice.
- Positive impacts on expenditure:
    a. Aligned services can shared administration costs and share benefits
    b. Reduction in the cost of servicing residents for instance with long term care needs or returning to poor quality housing after hospital treatment.

Quantifying some of the effects could be very difficult due to a high degree of uncertainty, e.g. impacts on public health budgets. Warming homes could potentially affect public health budgets through two different channels, although the sign of the net impact remains unclear. Specifically, an increase in the life expectancy of a person who lives in a warmer home could be assumed. However, this effect could be translated into an increase in healthcare later in life for other reasons.

The Energy Bill Revolution campaign has tackled this from the perspective of the need to make energy efficiency a 'national infrastructure priority'[28]. modelled a range of national retrofit scenarios all with the central assumption that all homes would need to attain an EPC 'C' rating by 2035, and carried out an evaluation of the tax implications and macro-economic benefits from investment in energy efficiency. There are many benefits and the report cites other secondary benefits as outlined elsewhere in this section, but the key outcomes are:

- £3.20 returned through increased GDP for every £1 invested by Government.
- £1.27 in tax revenues per £1 government investment through increased economic activity.
- A cost-benefit ratio (Vale for Money) of 2.27:1 which is officially classified as a "High" value for money infrastructure programme.

Locally, other significant benefits arise from the use of better data if collected in a structured fashion to better inform future works across a range of local authority services.

THE VALUE OF BUILDINGS

There is a growing evidence base suggesting that property values are positively affected by energy efficiency improvements. DESNZ (then DECC) carried out some work in 2013 based on an empirical investigation of the relationship between the energy performance ratings, as measured by Energy Performance Certificates (EPCs) and the sale prices of residential properties in England.[29] The report analysed repeat sales transactions involving 325,950 dwellings in the period from 1995 to 2011. It is the most comprehensive research in this area to date and indicated that energy efficiency is a key factor influencing the sale price of most residential dwellings in England.

More recently, the Nationwide Building society conducted research which found properties with and EPC rating of A or B had a modest price premium of 1.7% when compared to a similar property with a D rated property[30]. This research also found that properties with and EPC rated F or G were 3.5% less than a comparative D rated property.

The author's view is that at this time this benefit is very much on a case-by-case basis and has therefore not been included in the modelling undertaken to support the programme plan.

This means we have not included this within the benefits modelling within the later sections of the report.

4. Grouped Challenges

Many people have been trying to make domestic retrofit accelerate in the UK for many years. So why hasn't it happened yet if the case for action is so compelling?

The renovation of buildings, even without the need to drive a particular low-carbon agenda is very complex. If you were going to take an academic approach you would identify home improvement and refurbishment as a complex, dynamic system. If you seek to push or change one area of the system, many others will morph and start to behave differently. In addition, even when presented with very clear direction, people involved (do not make rational decisions, so adapting the industry may not create the desired effect on householders or the supply chain that serves them. The politics around the fairness of who to support, and whether we can force people to do things in their own home is has made change in this sector very hard to drive in recent years.

One way to address this problem is to identify all the 'barriers to retrofit', group them, then prioritise where to start. Individually, there are hundreds of inter-related barriers and the task can be confusing. Grouping the challenges is a methodology Parity Projects has adopted to cluster similar hurdles around an area of the retrofit 'system' that could be tackled simultaneously.

We have identified several key 'grouped challenges' in the 'normal' home renovation process. This process might be nuanced for different retrofit sectors and technical specialisms, but everyone that works in the sector will have built their customer journey, method statements, contracts, adverts, prices etc. around what they perceive as the 'normal' way of doing things. It is those processes that are very hard to change once they are running, and are the source of much of the often tacit resistance to change.

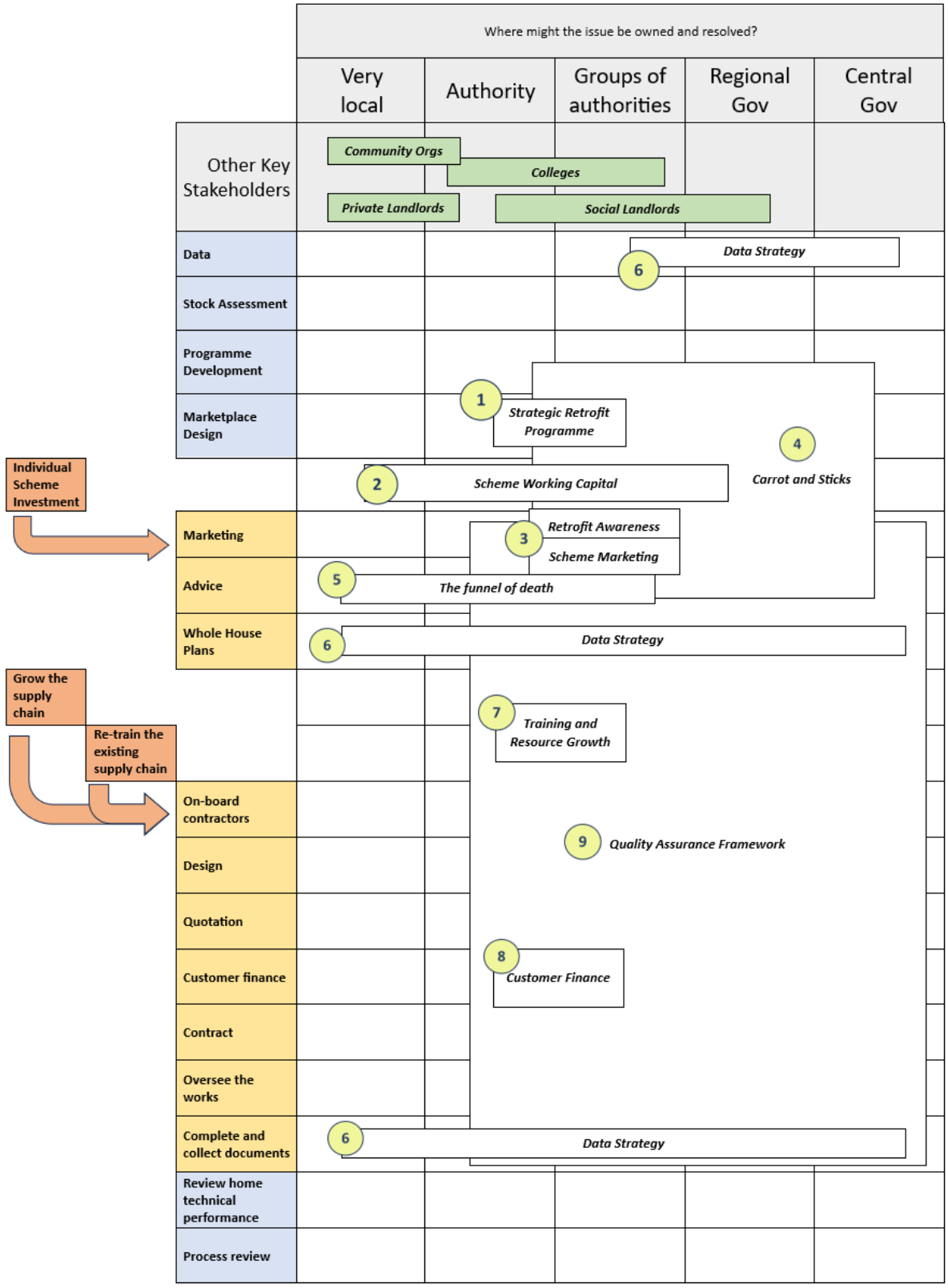
To move toward the practical, we can align the grouped challenges with key stages in the retrofit journey that we could be aiming for. The journey we set out is based on:

1. The extensive, cross-industry study carried out under the Each Home Counts Review[31] in 2016 following the less-than-satisfactory Green Deal. This review spawned the PAS2030 and PAS2035 standards which are underpinning key parts of the retrofit sector.
2. Parity Projects' extensive experience with social landlords, private landlords, local authorities and homeowners as they develop thinking and processes to systemise their retrofits. This adds mobilisation stages to regional schemes and review stages once they are underway.

By identifying groups of challenges in the system, we can decide who is best to own it and seek to minimise it over time i.e. we create the attenuation. We can seek to understand what support is needed for that group of issues and how long it might take to get to a point where an operational marketplace is enabled without incumbency dragging the group back to the status quo. The grouped challenges have common themes, but their embeddedness and appropriate 'owner' are unique to an area and to understand them fully needs consultation.

The diagram below sets out the grouped challenges we have sought to focus on in this report and how they impact the various parts of the retrofit journey.

Figure 4.1 Grouped challenges impact on the retrofit journey



To support this overview, the headers and further definitions are set out below:

Table 4.1 Overview of grouped challenges

		Grouped challenge ingredients
GC 1	**Strategic Retrofit Programme absence**	• No technical view of what retrofit is required to reach zero carbon performance. • There is no holistic view of achieving multiple benefits in one programme. • Resources are used chasing inappropriate funding pots that don't suit needs. • Procurement processes unable to be creative due to lack of vision.
GC 2	**Working Capital**	• No suitable funding available to provide working capital for delivery models that pull all components together. • Challenge to attract partners to discuss meaningful change
GC 3	**Generating demand**	***General awareness of retrofit*** • Good news stories compete with stories of bad installs. • Misinformation spread by well-funded proponents of non-eco measures. • Conflicting messages of retrofit approaches.
		Scheme marketing • The approach is not 'normal' and needs to rise above standard marketing • If offer is too narrow it defects its own purpose - needs to cover all areas to build customer trust. Other linked services that are off-message stop take-up (e.g. Building Control and Planning teams being unaware will sow doubt)
GC 4	**Carrots and Sticks**	• No 'structural' incentives act e.g. reduction in council tax or stamp duty, no tangible rise in house price (yet). • Energy saving or carbon saving benefits are not 100% guaranteed (yet). • No regulatory requirement to act. • No push or pull to take the next step.
GC 5	**Funnel of Death**	Linked to NFL 4 and 5: • Advice stage has funding for short periods, installations rely on referrals & hope. • Very inconsistent % conversion at each stage of processes undermining business cases. • When advice funding stops, the end-to-end is not self-sustaining. • Schemes are a risk to launch without whole-journey funding.

GC 6	**Data Strategy**	• Data is collected and used in many formats at a variety of stages of the journey.
		• Coordinated action across the complex market is hard.
		• Lack of framework makes post-completion data collection expensive and mis-aligned – so it doesn't happen.
		  ◦ Expensive to start,
		  ◦ Very hard to track progress and review.

GC 7	**Training and Resource Growth**	• Customers discover insufficient number of trades to meet volume even now, in advance of future large volumes. • Existing refurb trades resist retrofit to revert to their comfort zone. • Existing refurb trades also blame lack of demand as excuse for not retraining. • No training courses pushed due to lack of experienced training resource. • Training course business case hard to justify due to lack of demand.
GC 8	**Customer Finance**	• Customers seek financial support to bridge their affordability gap. • Finance providers do not believe there is sufficient demand to launch new products. • Finance providers do not understand retrofit risks so those 'green products' that are emerging are not attractive.
GC 9	**Quality Assurance Framework**	• No clear framework that covers all types of retrofit work, all types of customer • Customers face a lack of clarity on protections which differ across measures and project funding. • Contractors resistant to follow additional rules, 'paperwork' and what they see as hassle.

The next step is to understand how best to resolve the grouped challenges, and for Cheshire and Warrington sub-region, we need to understand what work there is to do and who locally is placed to do it.

5. Technology, Techniques and Infrastructure

A key facet of decarbonising housing within the Cheshire and Warrington area is developing an understanding of the technological challenges and barriers facing the region. This includes the types of technology required to decarbonise the housing stock, how best to install it to minimise costs and how best to interact with the energy networks operating in the region. This section provides some insight into the technological challenges that will inform the decisions on which route to take to decarbonise.

TECHNOLOGY

The table below is an overview of the total capital spend required to decarbonise the housing stock within the Cheshire and Warrington area without the installation of disruptive fabric measures. For more information on this, please see the separate technical reports.

Table 5.1 Overview of measures required to decarbonise the Cheshire and Warrington sub-region

	Investment	No. Measures	Average Cost
Individual Heating and Hot Water	£6,468,446,000	439318	£14,724
Identified PV system	£2,073,799,051	293828	£7,058
Roofs	£338,241,306	133495	£2,534
Walls	£232,299,110	111672	£2,080
Glazing	£112,963,462	18722	£6,034
Draughts	£27,965,870	91306	
Lighting	£19,625,532	302982	£65
Total	**£9,273,340,331**	**1391323**	**£6,665**

HYDROGEN

The modelling assumes that the decarbonisation of heat will be completed through electrification. Whilst the Government are not due to make a formal decision on the role of hydrogen in domestic heating until 2026, the assumption is based on analysis from both the independent Government advisory committees, the National Infrastructure Commission and the Climate Change Committee who have both advised there is at best, a very limited role for Hydrogen[32] in this sector. In line with this, the Government has also proposed that no fossil fuelled boilers, including those which are classed as 'Hydrogen Ready' can be installed in new properties from 2025 through the Future Homes Standard.[33]

Within Cheshire and Warrington sub-region, the village of Whitby near Ellesmere Port in Cheshire West was proposed as a test site for a collaborative trial between Government and industry of a village scale trial of a hydrogen network, however this was overturned following local opposition.[34]

This report recommends the local authorities in the region liaise with the Gas distribution networks active in the area to understand any future plans to trial Hydrogen in the region as well as any heavy industry operators who are looking to decarbonise their operations through hydrogen in order to map out any future potential hydrogen fuelled heat network zones, both those that are currently being developed and any further strategic projects which could be developed in the future.

It is important that all future local heat/ wider decarbonisation plans are devised in consultation with the three DNOs in the region to ensure the activities align with their planned network

reinforcement activities. A common theme during our consultation with the DNOs was a request for collaboration both now and in the future to deliver coordinated local area energy plans.

HEAT PUMPS AND FUEL BILLS

Heat Pump technology has been identified as the transformational technology for the sub-region based on the Pathways analysis. Policy professionals and retrofit professionals alike need to be aware of the natural tension, based on cost and performance, between de-carbonisation of a home using a heat pump and the aim of fuel bill reduction.

While heat pumps are generally known for their energy efficiency and environmental benefits, there are situations where they might lead to higher home energy bills. Several factors contribute to this and understanding them can help homeowners make informed decisions about heating systems. Here are some reasons why heat pumps may, in certain cases, result in higher energy bills:

1. **Installation Costs:** Heat pumps can have higher upfront installation costs compared to traditional heating systems. If a homeowner finances the installation through a loan or lease, the monthly payments may offset the energy savings, at least in the short term.
2. **Inefficient Existing Systems:** If a home has an inefficient heating system or lacks proper insulation, a heat pump might not perform optimally. For example, an undersized or outdated heating system may require the heat pump to work harder, potentially increasing energy consumption.
3. **Inadequate Insulation and Air Sealing:** Heat pumps work best in well-insulated and tightly sealed homes. If a home lacks proper insulation or has air leaks, the heat pump may need to run longer to maintain the desired temperature, increasing energy consumption.
4. **Improper Sizing:** An improperly sized heat pump can lead to inefficiencies. If the heat pump is too small for the heating load of the home, it may struggle to maintain the desired temperature, leading to longer run times and higher energy consumption.
5. **Electricity Costs:** If electricity costs are high in a particular region, the energy savings offered by a heat pump may be offset by the overall cost of electricity. In some cases, other heating methods, such as natural gas or biomass, may be more cost-effective depending on local energy prices.
6. **Lack of Maintenance:** Regular maintenance is essential for the optimal performance of heat pumps. If a heat pump is not well-maintained, it may become less efficient over time, leading to higher energy consumption.
7. **Behavioral Factors:** Homeowners' behavior can influence energy bills. For example, if a homeowner sets the thermostat to a higher temperature than necessary or leaves windows and doors open, the heat pump will have to work harder, increasing energy usage.

It's important to note that while these factors may contribute to higher energy bills in certain cases, heat pumps are energy-efficient and environmentally friendly heating solutions when properly installed and maintained in suitable conditions. Given the issues outlined above, the industry that will need to drive this roll out needs to be not only properly trained but experienced in the application of the technology. Moreover, the choice of heat pump and when to install it, amongst all of the influential factors on final carbon emissions and customer comfort, should be part of an overarching quality framework which we outline in Section 9.

Please see Appendix 3 of this report for two different analyses for one home in Northwich showing two installation recipes. The energy bill goes up if the heat pump is installed as the first measure, but if preceded by demand reduction (loft insulation) it contributes to a reduction in bills. In both cases, the heat pump contributes to a large reduction on CO_2 emissions.

FUEL POVERTY AND DECARBONISATION

There is a tension between decarbonisation and the addressing fuel poverty. As outlined above, the

installation of a heat pump can potentially increase the fuel bill of a household. This has the potential to exacerbate the extent to which a household experiences fuel poverty, meaning it can become a barrier to the rollout of low carbon heating. Due to this, it is important that fuel poverty schemes consider the impact of the roll out of heat pumps, ensuring appropriate extra measures such as insulation are installed as part of a whole house retrofit project to ensure the energy bills for the household are reduced, not increased at any one stage of the overall retrofit journey.

Please see the analysis in Appendix 3 of this report for an example of this.

DISTRICT HEAT NETWORKS

District Heat Networks supply heat from a central source to surrounding properties through a network of underground pipes. They often offer a low cost, low carbon heating source for more urban areas. The heat source varies but is often waste heat from a neighbouring industrial plant/ data centre. In the sub-region, the British Geographical Society have identified Crewe as only one of six locations in the UK suitable for utilising Geothermal heating. To investigate this further, the British Geographical Society have established the 'Cheshire Observatory' as a research centre in the sub-region.

Where they are a suitable solution, they are often a more cost-effective way of decarbonising the area rather than installing a heat pump in each individual property. This means it is important to consider as an option when creating a decarbonisation plan for the sub-region.

The potential benefits of heat networks mean the Government have proposed the creation of heat network zones,[35] where they are expected to offer the lowest-cost solution. This process will see central government creating a data-led spatial energy model which will be shared with local authorities who will take on the role of 'Zone Coordinators' when the scheme is rolled out. Ahead of this, Cheshire East commissioned a heat network feasibility survey [36] and have developed a business case for a Heat Network to supply heat to 1,500 new houses in the new Handforth Garden Village strategic development site.[37] They have also commissioned feasibility studies for heat networks in Alderley Park, Crewe Town Centre, Macclesfield Town Centre and opportunities within Rural Off Gas Grid Areas.[38]

ELECTRICITY DEMAND FLEXIBILITY

Electricity Demand Flexibility refers to the ability of electricity consumers to adjust their electricity consumption patterns in response to external signals, such as price changes or requests from the electricity supplier. This flexibility can play a crucial role in decarbonisation efforts. Here are several ways in which Electricity Demand Flexibility can aid in decarbonisation:

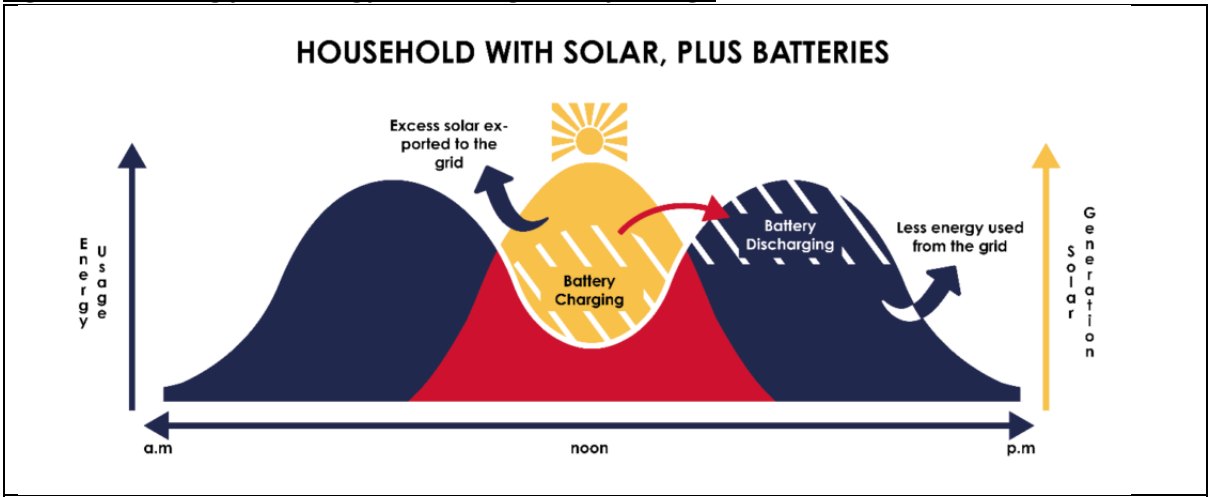
1. **Integration of Renewable Energy:** Demand flexibility allows consumers to shift their electricity usage to times when renewable energy sources, such as wind or solar, are abundant. This helps in optimizing the use of clean energy and reducing reliance on fossil fuel-based generation during peak periods.
2. **Grid Balancing and Stability:** By adjusting electricity consumption based on grid conditions, demand flexibility can contribute to grid stability. This is particularly important as the share of variable renewable energy sources increases. Flexibility in demand can help balance supply and demand in real-time, reducing the need for backup power from fossil fuel sources.
3. **Load Shifting and Energy Storage:** Demand flexibility enables load shifting, where electricity consumption is moved to times when energy is abundant and cheap. This can coincide with periods of high renewable energy generation. Additionally, demand flexibility can work in tandem with energy storage technologies, allowing consumers to store energy using batteries during low-demand periods for later use.
4. **Demand Response Programmes:** Utilities and grid operators can implement demand

response programs, where consumers receive incentives to adjust their electricity usage during periods of high demand or grid stress. This not only helps in decarbonization but also enhances grid reliability.

5. **Optimising Energy Efficiency:** Demand flexibility encourages consumers to use energy more efficiently by aligning their consumption with times of lower energy costs or higher renewable energy availability. This can lead to overall energy savings and a reduction in greenhouse gas emissions.
6. **Enabling Electrification of Various Sectors:** Demand flexibility can support the electrification of sectors such as transportation and heating. By allowing consumers to charge electric vehicles or use electric heating systems during optimal times, the overall energy system can be better coordinated and decarbonized.

To maximise the potential of Electricity Demand Flexibility in aiding decarbonisation, it's crucial to have supportive regulatory frameworks, advanced metering infrastructure, and effective communication channels between consumers and DNOs. Critically for homes, the integration of smart technologies, such as smart appliances, and home energy management systems, can enhance the implementation of demand flexibility strategies, but above all the introduction of domestic battery storage units to homes is a necessity. The actual carbon savings created will depend on the carbon intensity of the electricity grid at different times. For instance, if demand flexibility is employed during times when the grid relies heavily on fossil fuels, the impact on carbon reduction may be more limited.

Figure 5.1 Shifting peak energy loads using battery storage



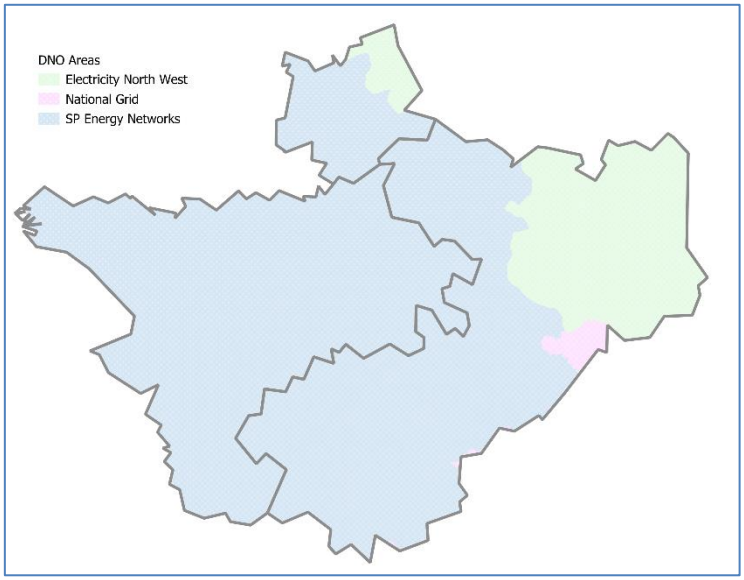
Credit: National Energy Action

Due to the difficulty in modelling the impact of batteries and flexibility, we cannot project forward the potential for this report, but it is worth knowing that typically within Solar Together programmes, there is a naturally very high take-up of batteries.

DISTRIBUTION NETWORK OPERATORS (DNOS), GRID RESILIENCE AND RETROFIT

Three Distribution Network Operators (DNOs) operate within the Cheshire and Warrington area, Electricity North West, SP Manweb and National Grid Energy Distribution. These companies are responsible for providing every home with a reliable electricity supply at all times and their activities are funded through a part of fuel bills and regulated by Ofgem through the RIIO ED2 price control.

Figure 5.2 Map of DNO areas in Cheshire and Warrington sub-region



As outlined above, a key challenge facing the DNOs is how best to ensure their networks have sufficient capacity to support the electrification of heat and transport in the region whilst allowing the connection of increased levels of zero carbon electricity generation such as solar panels. This requires additional capacity on the network to ensure it can handle household usage during peak usage periods. Historically, their approach would have been to reinforce the network with additional network equipment with the cost being passed onto the households through increases in the network fees included in fuel bills. Owing to the scale of the challenge facing DNOs across the UK to meet net zero, Ofgem/ the Government have pushed for the evolution of the networks to Distribution System Operators, utilising flexible technologies such as battery storage to defer household usage during these peak usage times to reduce the costs of the transition.

Below we summarise our research into the regional challenges the three DNOs are facing with the Cheshire and Warrington area.

Figure 5.3 Overview of DNO areas with Towns in sub-region

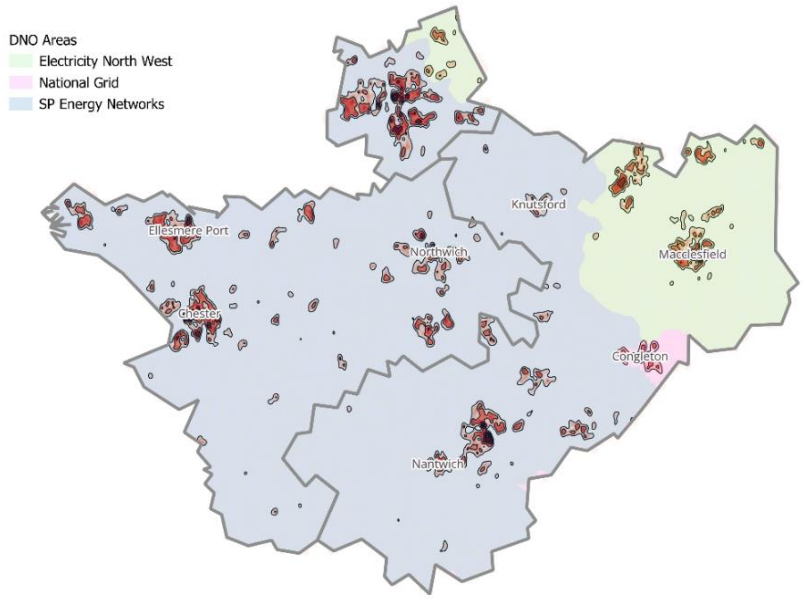
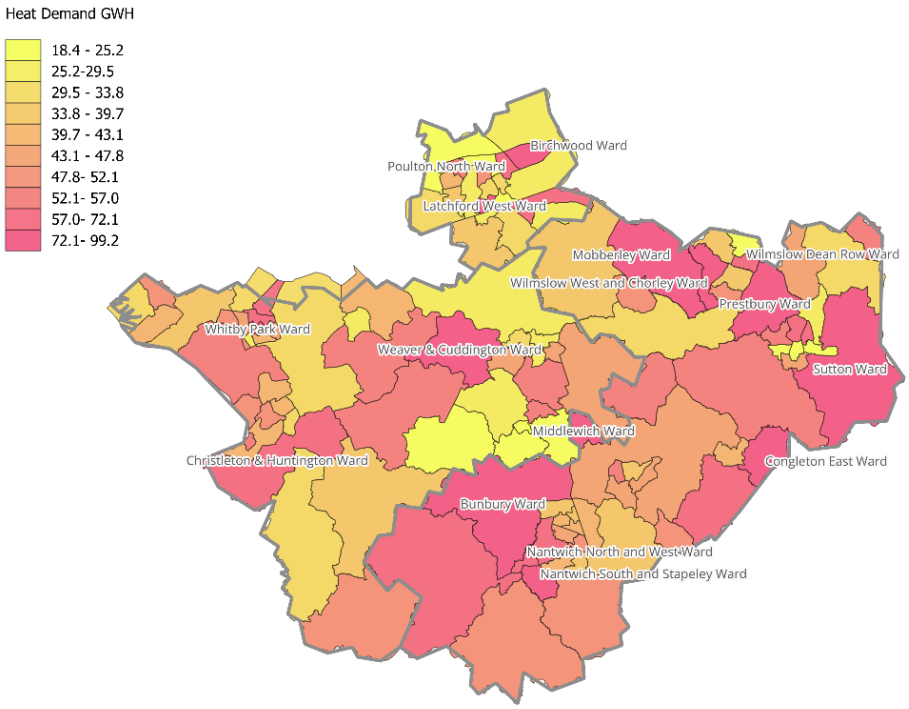


Figure 5.4 Heat Demand by Local Authority Ward Areas



To begin understanding the challenges facing the DNOs we have mapped out the heat demand across the region. The wards where total heat demand is seen to be highest are those in areas of denser population, however for the largest settlements, such as Crewe and Warrington, the separation of these into multiple wards sees the total heat demand being lower.

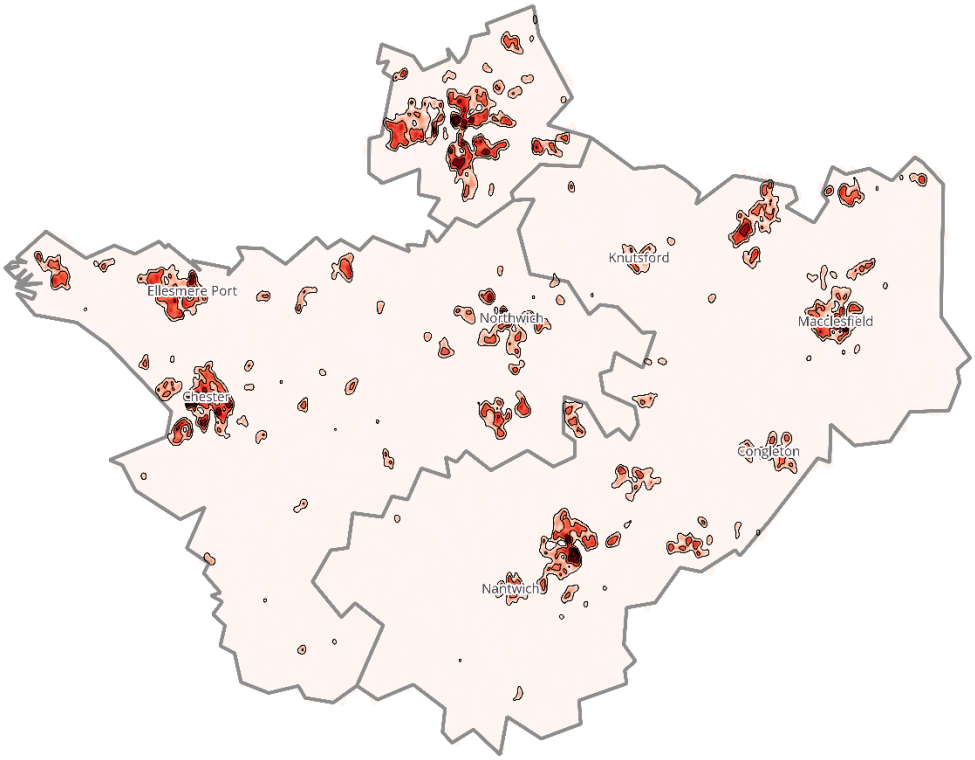
Named above are the wards with the highest heat demands, with demand exceeding 70 gigawatt hours.

This visualisation gives a broad indication of areas where heat demand density is highest across Cheshire and Warrington, however due to the division of larger settlements into multiple wards a lot of the relationship between areas is lost.

For our key heat mapping process, we ignored any internal boundaries to provide a continuous heat map across Cheshire and Warrington to better highlight these nuances. Our heat mapping however doesn't factor in properties that are immediately surrounding the areas of interest, in reality where there are large settlements bordering Cheshire and Warrington there could be additional opportunities for heat network development working in collaboration with neighbouring Local Authorities, such as utilising the close proximity of Manchester Airport, Sale and Altrincham to the more rural border areas of Cheshire East and Greater Manchester to develop larger scale schemes than would be possible looking solely at the heat demand data of Cheshire East.

Heat Density Mapping
Our methodology for developing heat demand density mapping for Cheshire and Warrington implemented the data we hold for all properties across the area, aggregating the data for energy usage to highlight the areas where the was the best viability for heat network development.

Figure 5.5 Heat demand density in Cheshire and Warrington sub-region



Our first steps were to develop heat demand density maps across Cheshire and Warrington. There is understandably a large correlation between heat demand density and population density and settlement size, however we found a significant number of small settlements where there is significant potential for heat network projects to be developed.

From the heatmap we identified three classes of area and their viability for heat network projects base on the heat demand density in their location; high density, medium density and low density. We did not aggregate the data for low density as the insights gained from this would be less significant, this is not to say that no low-density areas would be suitable for heat networks, as heat

networks can be developed in nearly every environment, just that these areas are less likely to see a significant benefits.

It is worth noting that the definition of these bands is based on the metrics underlying the heat mapping but is not meant to indicate an exact prescribed threshold, these bands could be moved slightly and still hold the same significance. We have sought to highlight the best opportunities with broad bands as to not indicate that only properties within these bands are worth considering, properties on the threshold of a density band would obviously still be worth considering in the development of a heat network that was within the higher band.

Beyond simply identifying which properties were in the High and Medium Density bands we characterised the properties within the bands. Of the total 440,235 properties the high and medium bands contained the following.

Table 5.1 High and Medium Density properties in Cheshire and Warrington sub-region

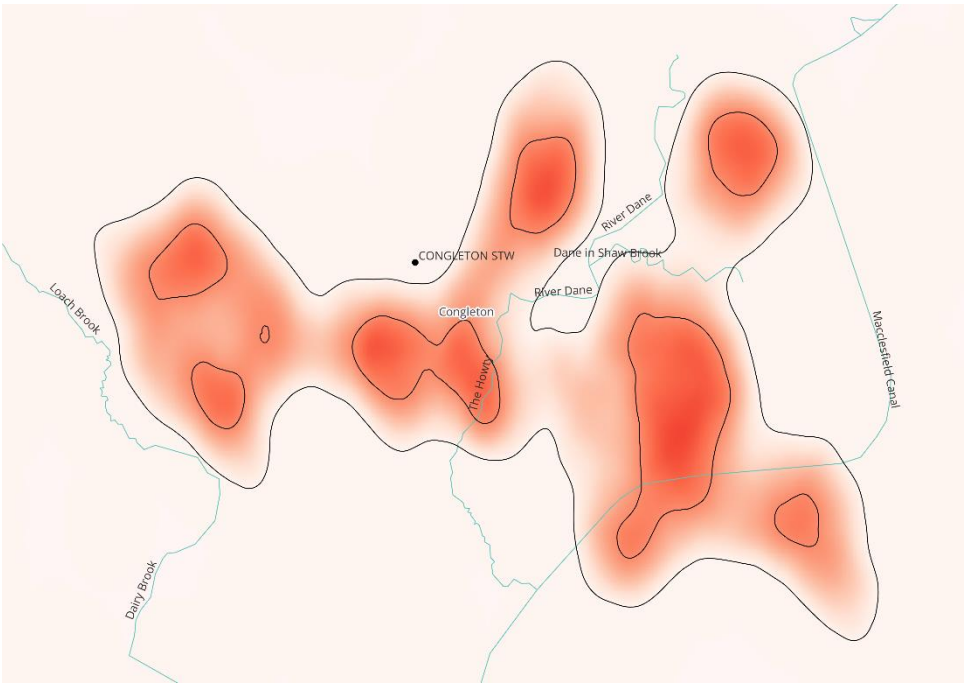
Feature		High Density	Medium Density
No. of properties		31,118	283,125
Property type	Houses Flats	82% 18%	88% 12%
Attachment	Detached Semi Terraces	8% 29% 63%	28% 40% 32%
Wall Construction	Cavity Solid Other	45% 54% 2%	82% 13% 4%
Wall Insulation	Insulated Uninsulated	19% 81%	42% 58%
Heating Type	Boiler Other	91% 9%	93% 7%
Fuel	Gas Electricity	93% 7%	94% 5%

These figures can give some key insights into the make-up of the highest demand areas

- Higher proportion of semi and terraced in high density areas.
- Similar heating types across both bands, higher penetration of mains gas than the wider region.
- Proportion of uninsulated walls much larger in High Density than Medium Density areas (80.8%/57.6%).
- Indicates improved insulation levels would change defined areas.

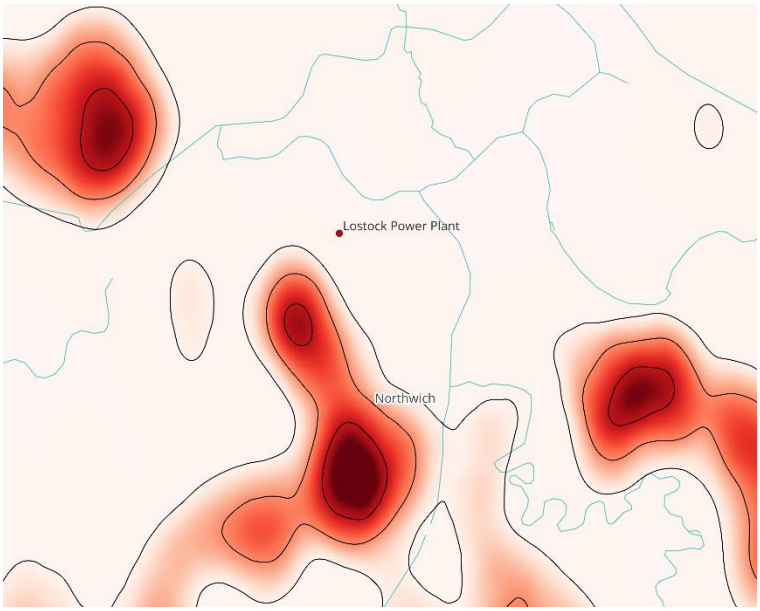
We have selected several case studies to give an idea of the nature and scope of the opportunities for heat network development across the region. These could be expanded on to inform heat network design in the future.

Figure 5.6 Case Study 1- Congleton



In and around Congleton Sewage Treatment works there are several existing estates of very similar archetype. They are however not high in density and this may prove a challenge for justify the business case for a heat network in this location. More promising might be the prevalence of new homes being built in the vicinity which would make supply of heat more cost effective if retrofit of supplies is avoided.

Figure 5.7 Case Study 2- Northwich



We see several areas of high density areas in and around Northwich, West Cheshire. Nearby to these is Lostock Coal Power Plant which is due to be converted into an Energy from Waste facility. There is the potential to directly heat these homes from energy generated by the plant.

Several other towns that may be viable for similar schemes are:

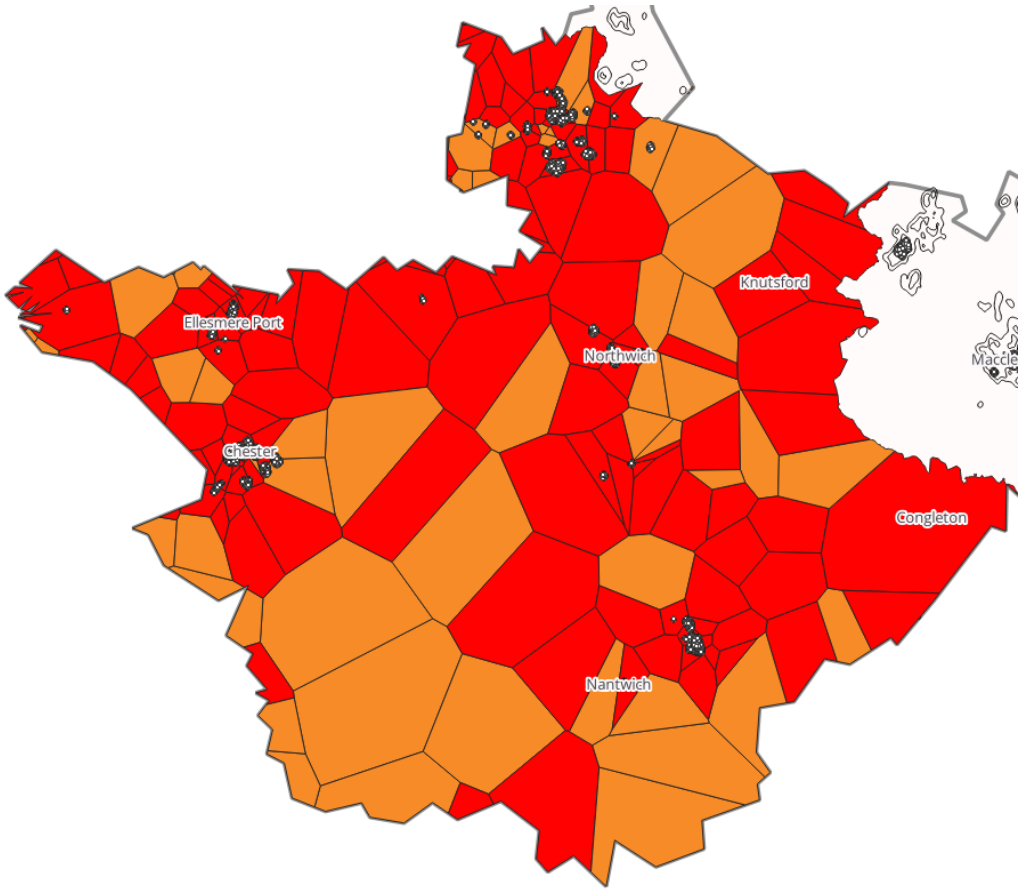
Figure 5.8 Study 3- Lymm

Despite being relatively small we have identified an area of high heat demand density in the centre of Lymm outside Warrington. From the data sources we have gathered so far there are no large waste heat sources. However, the area could have the potential to have a small heat network of community heat pumps to heat some of the town centre streets. As the area in question is near the canal a system of water source heat pumps could be investigated

Grid capacity

To provide further insight into areas of focus, we have produced the diagram below. The areas are red where SPEN say the overall capacity is poor, the white dots are the high demand properties and most of them if they are roughly equally between two substations will sit between two low-capacity ones. It is fair to draw the conclusion that any built up area is already offering grid stress, and an uncontrolled heat pump deployment would cause grid access problems for large numbers of people and businesses.

Figure 5.9 SPEN Grid Capacity



Comparison of Heat Demand to Grid Capacity

Our next step was to investigate the current grid capacity in the region to try and highlight areas where developing heat networks would have the greatest impact on alleviating grid stress. For our analysis of grid capacity, we focused on ENWL, however we are working with the other DNOs to gain access to the required data to undertake similar analysis of the rest of the Cheshire and Warrington region which at the time of writing has not been forthcoming.

The following maps compare the DNO regions, their grid capacity and the density of homes requiring heat sources that will revert to electrical load over time.

Figure 5.10 DNO Regions

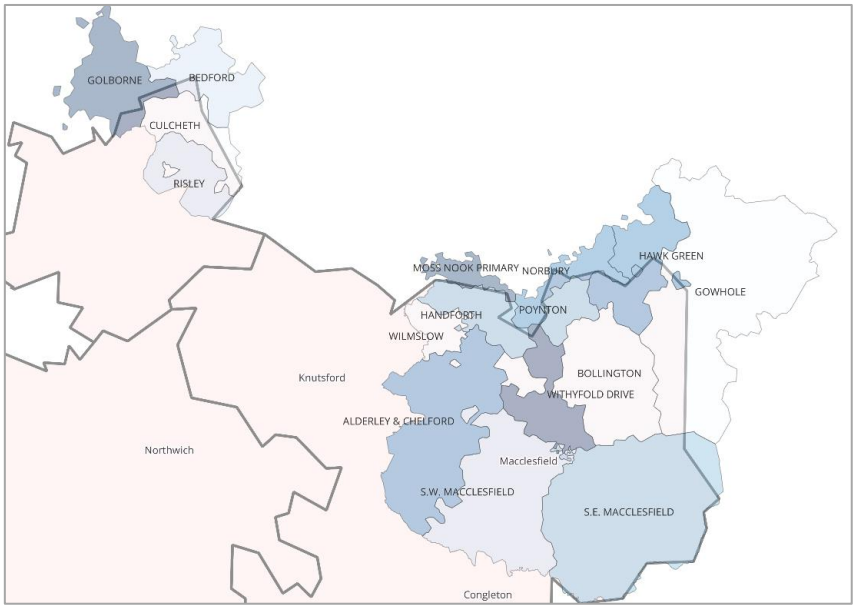
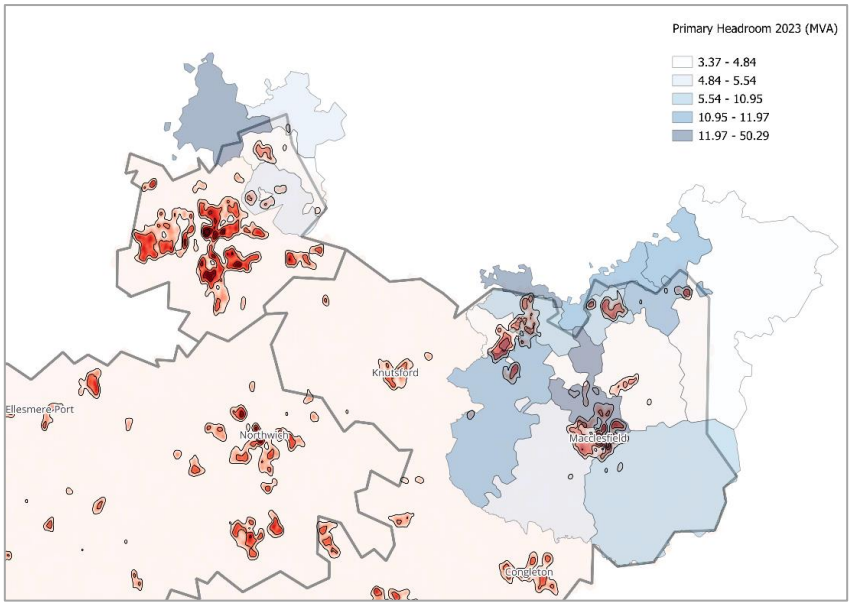


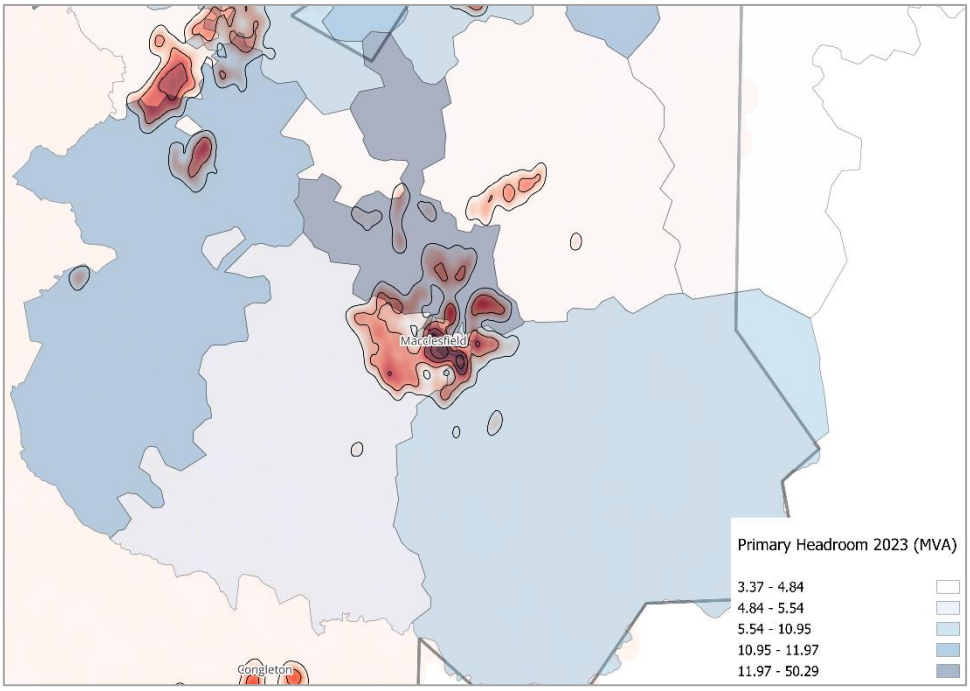
Figure 5.11 DNO Primary Substation Capacity



By comparing the headroom for each of the primary substations to the heat demand density we can see an additional factor to consider when looking at where to develop heat networks and determining the priority of which areas should be focused on more urgently.

One area where this difference is significant is in Macclesfield. While there are areas of high heat demand throughout Macclesfield the headroom of the primary network covering North Macclesfield is significantly higher than South Western Macclesfield. Prioritising development of heat networks in Southern Macclesfield in the immediate future will have a more significant impact on alleviating grid stress. The next stage of this research requires access to the secondary substation level data in order to provide more localised insights into potential constraints.

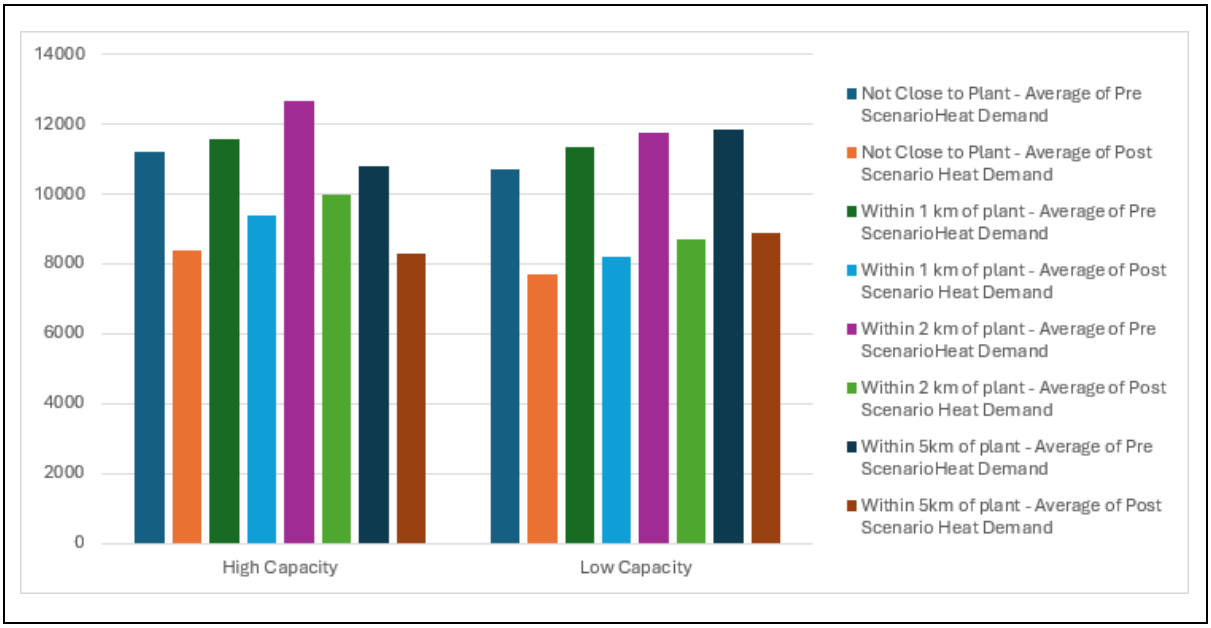
Figure 5.12 Grid Capacity and Heat Demand in Macclesfield



Heat demand, grid capacity and district heat networks

Once more data is forthcoming more detailed analysis can be undertaken, but at this time we are able to offer some insight in summary with regard to the heat network opportunity. For all properties that are in high density areas, the capacity refers to whether they are in a primary area with stretched capacity and then the legend indicates how close to a potential source it is, with both a pre and post fabric retrofit work.

Figure 5.13 Average annual heat demand scenarios relative to the groups of homes proximity to heat sources as shown – ENWL and SPEN region.



The next step beyond this work would be to use time-of-use data as provided to us by the Centre for Net Zero to calculate peak loads for all properties and their reduction from retrofitted insulation. If this is possible, the sub-region would have the ability to model peak loads as each retrofit programme is established.

6. Skills and jobs required

A study is currently underway, led by the NW NZ Hub, to understand the current level of regional employment in the retrofit sector. When aligned with the work within the Pathways report that outlines the workforce numbers required to deliver the remaining retrofit measures, the net figure can be reached of new entrants that will need to be created by training providers. This is expected to report in March 2024.

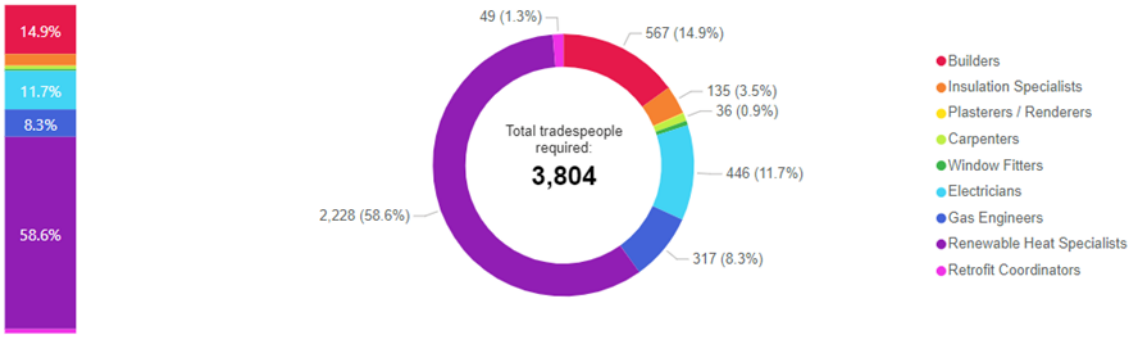
WORKFORCE PROJECTIONS

This section sets out the volume of trained people needed. The Parity Pathways Report calculated the measures required for housing to reach Net Zero performance which means an estimate can be made of the workforce needed to complete the work.

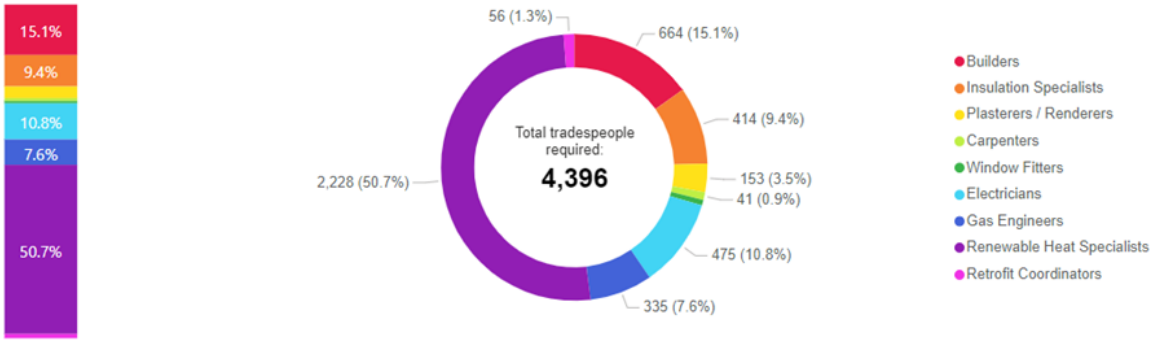
The graphs below show the breakdown of gross FTE trade years by specialty for the two modelled net zero Scenarios. In both Scenarios the largest demand comes in renewable heat specialists, reflecting the scale of the challenge to decarbonise all heating systems. The annual requirement depends on the target year for meeting the Scenario target and the figures below display the annual gross workforce requirements assuming a constant delivery every year between now and 2040.

Figure 6.1 Trade requirement for net zero scenarios

Trade Requirements 2040 Delivery **Net Zero – Less Disruptive Fabric measures**



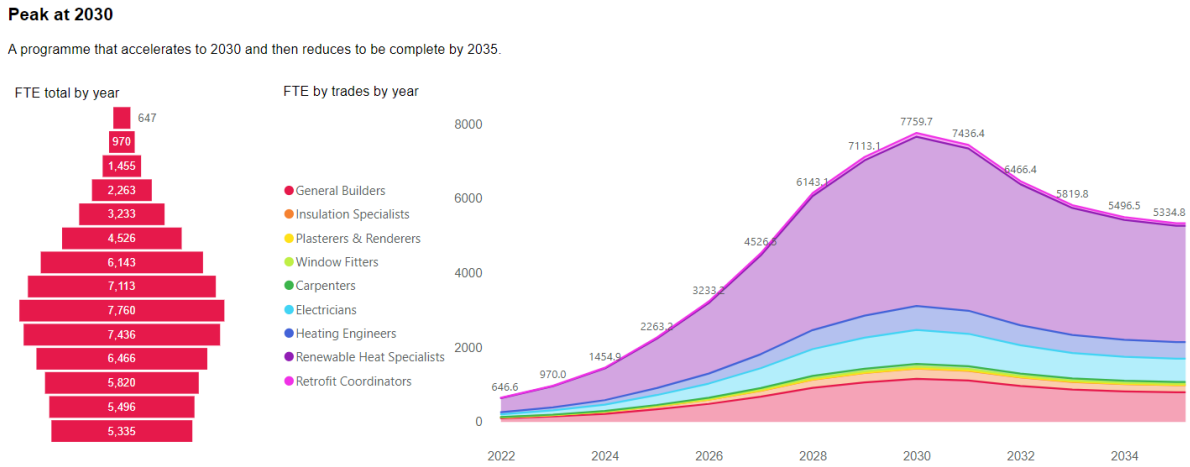
Trade Requirements 2040 Delivery **Net Zero – All Fabric measures**



Whilst these numbers appear large, if aligned with a deliverable schedule of works and the grouped challenges described earlier are tackled, they can be built up over time. The flip side to this of course is that the longer it takes to reach agreement on the delivery mechanism, the larger these numbers get given the deadlines imposed in local targets. It is important to note not all of these will be new jobs with a proportion coming through the retraining of the existing supply chain. The exact ratio of new/ retrained jobs is dependent on a wide range of factors, including the demographics of each trade, for example as noted above the current average age of a gas engineer is 58 and thus a large swathe of this trade is unlikely to want to retrain as they near the conclusion of their career.

Here follows one of several deployment profiles modelled in the Parity Pathways platform for the sub-region which looks more practically at the number of trades that would be required as the market for domestic builds up over time:

Figure 6.2 Gross trade deployment profile for the Sub-Region



LOCAL SUPPLY CHAIN ADEQUACY

A full review of the local supply chain is under way, to be useful, it would need a combination of desktop work and on-the-ground visits and workshops.

A. **Adequacy of the local supply chain** - This is a function of technical competency and the numbers available to work and it is not clear at this time how much work is required to ensure there is one.
B. **Give them consistent work and they will invest** – Each company needs to weigh up the work projected, how likely they are to win it, at what price, and how much do they need to do to access it. However, this is also tempered with significant initiative fatigue in particular with the overtures made about the Green Deal and how it failed.
C. **How much resource-building is required** - Numbers of local resources need to be mapped at a very early stage on the programme development. This will need close collaboration with local colleges to put in place an engine that supplies trades of the quality needed at the time required.
D. The new Apprenticeship Levy can be used to support the funding of training development and delivery

For any work needed in addition to the current study, all of the above would need to be factored into the costs of the programme.

A previous study by the Cheshire and Warrington LEP[39] identified approximately 4,000 jobs in the Low Carbon and Renewable Energy sector (LCRE), compared to 21,000 in standard construction. The

study also found almost half of the jobs in the sub-region will be significantly impacted by the transition to net zero, meaning much of the existing workforce will need to retrain.

In order to retrain the existing workforce, much more than the offer of high quality training needs to be in place. The industry needs very strong signals that their existing practises will cease at a given date in the future for them to take this seriously. The danger here of course, given the average age of a Gas Engineer in the UK is 58, that they will simply retire. As noted in section 3, both Cheshire East and Cheshire West and Chester have populations which are slightly older than the UK average, a trend which will be reflected in the demographic of the workforce.

By way of example of how much work is required to support a transition, here is an account of the transition to condensing gas boilers. On 1st April 2005 condensing boilers were made mandatory in new installations in UK homes. The change was made in the 2003 Energy White Paper, announced on 24th March 2003, thereby giving the supply chain 2 years' notice.

A rapid programme of skills and training was recognised as critically important in the short period between the White Paper publication and implementation of the new standard. This was begun very rapidly. The initiative aimed to provide 70,000 installers with the skills needed to specify and install condensing boilers and properly advise consumers on high-efficiency heating systems. Following the completion of pilot courses in 2003, a series of 'Train the Trainer' courses were held in February and March of 2004, and the first of the Installer courses commenced in March 2004. The aim was to pass 45,000 installers through the programme by 1 April 2005 and a further 20,000 (bringing the total to 65,000) by the end of 2005. The Training programme was funded from April 2004 until March 2005 by the Learning and Skills Council, though initial funding to get the programme started was provided by Energy Saving Trust (back then an independent and impartial organisation with direct funding) and with Defra support.

The training covered a brief introduction to climate change and the Energy White Paper, changes to Building Regulations coming in April 2005, the elements of high efficiency system specification (boilers, controls etc).

The programme of training was completed on schedule and was widely recognised as being successful. Indeed, a 30% market share was achieved in the year before the regulation was implemented. Faced with a clear regulation, manufacturers changed their product range and supported the necessary training programme. Installers recognised the need to adapt and undertook the necessary training.

What is clear from this example is that the stakeholders and partners involved in the process that represented the broad range of interests needed to be "on board" to make the transition work. It is also very important to recognise that this was a 'like-for-like' technology swap and very much simpler than changing the entire heating regime of a home from one central source of instant (high CO_2) heat, to low temperature renewable heating in a home that requires larger radiators, more constant heating patterns and an understanding of the levels of insulation to make it work.

RETROFIT TRAINING PROVISION

Our engagement with local colleges found that there was a wide range of the retrofit offers from the colleges in the area, as summarised below.

Table 6.1 Summary of insights provided by colleges within the sub-region

College	Insights provided
Reaseheath	**Currently offers:** - Level 2 introduction to retrofit covering external wall insulation and renewable energy. - Level 2 External Wall insulation geared towards plasterers wanting to upskill and others wanting to retrain. **Currently developing:** - External wall insulation and/or internal insulation solutions- Staff CPD Training. - L3 Award in Air Source Heat Pump Systems- Staff CPD training - External and internal building retrofit solutions Staff CPD Training. - Domestic and Commercial EV charging installation- Staff CPD Training.
Warrington and Vale Royal College	**Currently offers** - Qualifications in understanding retrofit to existing cohorts. - Green skill enhancements and collaboration opportunities to collaborate on green initiatives for its current students developed in conjunction with its employment partners. **Currently developing:** - Green Skills Training Academy to be launched in September 2024 with a focus on developing skills needed for retrofit and decarbonization of both domestic and commercial properties. Includes installation of low carbon heating, solar PV, storage and smart home technologies.
Cheshire College South and West	**Currently Offering** - A fully functional sustainable house training environment at the Ellesmere Port campus. House has been fitted with latest sustainable technologies such as GSHP/ Solar PV sourced from local businesses. Provides opportunity for students to work on installation and maintenance of technologies in real world environment. Also trains students on how to examine the analytics of the home. - Also offers programs in ASHP, storage systems and EV charger installation. **Currently developing** - Staff upskilling in solar thermal hot water, installation and small scale PV systems and roof and wall insulation.
Priestley College	**Current Offering** - Upskilling for 16-19 year old students so they are better equipped and prepared to progress in green skills occupations, apprenticeships or HE courses. **Currently developing** - Wider green skills offer.

College	Insights provided
Macclesfield College	Owing to long term sickness Macclesfield College were unable to provide an update at the time of writing.

The colleges in the sub-region have also been selected by the Department for Education and the Institute of Technology to run a joint venture with local employers which will see £14.2 million invested in the region.[40] The funding is for capital investment to provide students with access to state of the art equipment and facilities. This funding covers a range of sectors including construction skills. The first learners on this programme will start in September 2024.

In addition to this, the Cheshire and Warrington LEP has the opportunity to benefit from over £2 million of funding from the Department for Education for Skills Bootcamps that will:

- Help employers fill vacancies and develop their own skills and/ or the skills of their workforce.
- Help local residents of all ages over 10 develop the skills they need to find a job or to improve their existing skills to help them progress work.

Currently the LEP is providing an Air Source Heat Pump installation bootcamp and are looking to widen this offering to cover Electrical Engineering and Retrofit Assessment.

Beyond qualifications

Much of the resistance of smaller building and specialist contracting forms to moving into the domestic retrofit market, aside from the inconsistent demand, is the number of hoops they much hurdle before they can start on site. For instance, the barrier cited by contractors as a key cause of their lack of interest in the Green Home Grant Voucher Scheme was that the PAS2030 certification that they needed was required on each measure, individually.[41] Each certification has a cost and time commitment to accessing and an annual fee for renewal.

On that basis, local training providers should consider the full provision of support for SMEs beyond individual qualifications. If they have to navigate this themselves, they are very likely to stall.

Individuals:

- An overview of the retrofit sector as a whole so that they can place their career trajectory.
- An overview of PAS2035, the roles within.
- Any emerging quality assurance frameworks that may emerge for the C&W area.

Companies:

- An understanding of quality assurance schemes / PAS2030 certification / MCS certification etc.
- Support to access those schemes.
- Training on particular manufacturer products in order to access the warranties e.g. heat pumps, external wall insulation.

Building-up training resource

A common issue flagged through this engagement was a difficulty in recruiting/keeping staff to train learners. We heard examples of colleges finding they could not match the wages offered by companies installing heat pumps. This has resulted in one college investing in three heat pump installation rigs but being unable to offer any courses at the time of writing.

Creating SMEs

It is our assertion that if the sub-region is to accelerate this market, it cannot rely on discovering new trainees to enter the market, in conjunction with the possibility of retraining the existing market, particular if there is no regulation to force changes. Moreover, the existing firms that are enthusiastic to the change may not be able to cope with the volume of new staff needed if they were to be successful in tapping into a much larger share of the market.

Colleges, in conjunction with Economic Development officers, should consider how to tap into the nascent population of entrepreneurs that need supporting in creating new local companies.

WHAT DO PEOPLE BUY?

The table below sets out three types of job that would bought by a customer and the level of overall service content required to do the job well and to ensure customer protection. This also points to the underlying commercial knowledge that needs to be instilled in trainees and considered when shaping local supply chains.

Figure 6.3 Summary of retrofit offerings to households

Job Type	1	2	3
	Straight to Contractor	**Straight to Contractor with Impartial RC**	**Third party professionals and with contractor(s)**
e.g.	Solar PV, Heating System install	Multiple individual measures and/or one high risk measure	Category 2, plus structural alterations
Stages:			
Plan Builder	Home assessment, ask questions to gauge job type		
Retrofit Coordinator	Can be Contractor's own – job is digital process driven inc. audit at the end.	RW appoints RC	RW appoints RC
Whole House Plan	Optional: customer or contractor can buy if they wish	Recommended: customer or contractor can buy if they wish	Mandatory: customer or contractor to buy
Design 1	Contractor	Contractor	Contractor where warranties are involved
Design 2	N/A	Interfaces by Retrofit Designer	Structural design, architectural and interior designer, Interfaces by Retrofit Designer
Principal Designer	Contractor	RC	RC
Competitive Tender	Not required	Not required	Yes
Contractual	Templates provided by RW	Templates provided by RW	Templates provided by RW
Principal Contractor	N/A	If all on site separately, N/A	Required - Lead Contractor
Technical oversight	N/A	RC	RC and RD

Contractor training	N/A	Process and retrofit knowledge	Process and retrofit knowledge
Project Management	N/A	N/A	Project Manager - additional cost to customer
Budgetary control	N/A	N/A	QS or Cost Consultant Access - additional cost to customer
Audit	Audit process		

The delivery models need to be flexible enough to cope with each type and ensure that there is a sophisticated level of supply chain and customer management to direct each job accordingly. This chart highlights how many moving parts must be brought together for it to be successful.

If we are considering training requirements based on the nuances of these job types, its goes beyond standard skills qualifications. Behaviours, management, customer service, sales etc not just skills

WHAT IS THE SUPPLY CHAIN INTERESTED IN?

This is a critical question. How do we make this market attractive enough for contractors and professionals of all kinds to invest in it for the long term? The diagram below is not based on an extensive data set, but distilled from hundreds of conversations with people working in the supply chain. The colour codes indicate the level of attractive of the market sector per column, based on the criteria set out per row.

Working for willing-to-pay customers in owner occupied homes or private rentals is, on the whole, an unattractive place to be for them. Those that are experienced and have the resources to access the procurement processes, accreditations etc that allow them to access social housing market get a steady stream of work with a client that pays them on time.

Owner occupiers are circa 71% of the housing in the sub-region, and as such offering the supply chain support to counter these views in addition, it would be recommended that some market research is done to corroborate this contractor outlook.

Figure 6.4 Attractiveness of markets based on contractor's own criteria

	Self-funded					Government grants		
	Privately owned				Social housing		Privately owned	
	Owner occupied							
	Type 1	Type 2	Type 3	Private rented	Own funds	Grants	Owner occupied	Private rented
Regulation forcing action (definite market)								
Educated client								
Consistency of market at volume								
Funds available to pay								
Reliability of payments								
Access to the right skills								
PAS 2035 needed								
WHEN TRYING TO CONVINCE: Contractors have previous experience of this work?								

What this does show is the need to create the conditions that attract smaller suppliers to this 71% of the market, on top of the need to offer training.

7. New build, Tenure and rurality

This section reviews the regional retrofit progress made in each housing tenure. The ability to plan and deliver retrofit at-scale in each tenure varies considerably. Social homes are numerous and under the control of landlords with a social purpose, to focus on the needs of the resident.

NEW BUILD

New properties are typically more energy efficient than their older counterparts. However, current building regulations do not require them to be net zero ready, for example allowing for the installation of fossil fuel boilers meaning owners of these properties will still need to invest in a selection of retrofit measures to decarbonise/ meet net zero deadlines. This is in part due to the majority of housing developers not looking to deliver higher levels of energy efficiency performance than set out in building regulations as part of their business as usual activities.

Some Local Authorities have looked to implement more stringent planning regimes which require properties to be net zero ready in their areas, for example Essex County Council recently engaged in a research piece which included engaging a King's Council to review the legalities of such a scheme. This legal review found that the law did allow for Local Authorities to require higher energy efficiency standards than those set out in National Building standards[42] in their Local Plans. This legal review highlighted numerous examples of where local authorities have set increased standards of energy efficiency/ heat demand than national building regulations. These include the London Plan 2021 which outlined 'Major developments should be net-zero carbon […] A minimum on site reduction of at least 35 per cent Beyond Building regulations is required for major developments. Residential development should achieve 10 percent […} through energy efficiency measures.[43]

From 2025 the Future Homes Standard[3] will set out increased energy efficiency standards to ensure these properties do not require any retrofit measures to be 'zero-carbon ready'. This includes a proposal for the main heating source to be heat pumps and an option for an obligation for solar panels.[44]

An example of a new development in the region which has delivered decarbonised housing is the Sycamore development near Warrington. This development of 92 properties featuring Ground Source Heat Pumps and Solar Panels was delivered by Incrementum, a housing company wholly owned by Warrington Borough council to reuse redundant council land.

[3] Please note at the time of writing the measures outlined within the Future Homes Standard have been set out in a Government consultation as proposed positions and are yet to be formerly adopted

Figure 7.1 Map of Sycamore development

Each of the three councils in the region have set out targets for new housing in their area through their Local Plans.

Table 7.1 Number of houses outlined in sub-regional Local Plans

Council	Time Period	Number of Houses	Average housing delivery per year
Cheshire East	2010-2030	36,000	1,800
Cheshire West and Chester	2010-2030	22,000	1,100
Warrington	2021-2038	14,688	816

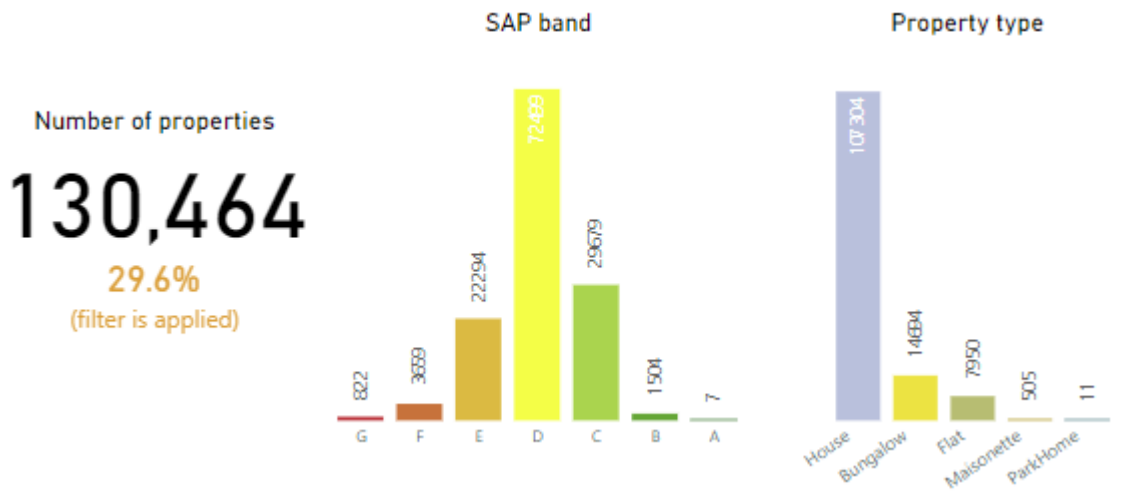
As a significant number of these will be built to the new Future Homes Standard, a lot of the skills required to build them such as heat pump/ solar panel installation are also directly transferable to retrofit. For those built before the standard comes in, as noted above these are likely to require a range of retrofits to be decarbonised.

OWNER OCCUPIERS

The Housing Decarbonisation Report - Technical Analysis of housing stock which accompanies this report is limited in it's ability to fully evaluate the tenure of properties in the region owing to a combination of inconsistencies in the data inputted into EPCs and the process it using to model properties without EPCs.

Below is a summary of a breakdown of the EPC band and property types of the properties classed as Owner Occupied on the system.

Figure 7.2 EPC breakdown of Owner Occupied properties in Sub-Region



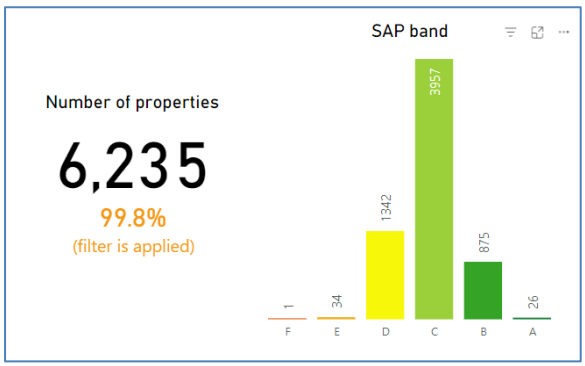
As shown in the above, the breakdown of owner occupied properties is broadly aligned with that of all properties within the sub-region

SOCIAL HOUSING

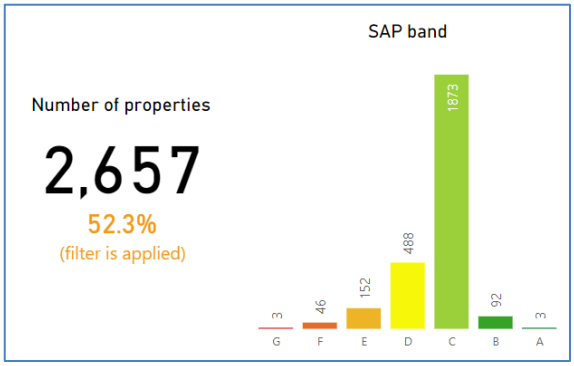
We have previously worked with a couple of the Social Housing providers in the area to understand their housing stock. Both Weaver Vale Housing Trust and Muir Housing have kindly allowed us to include this analysis in the report.

Figure 7.3 EPC breakdown of Social Housing stock in the sub region

Weaver Housing Trust



Muir Housing



As shown above, both organisations have a low proportion of their stock which is below EPC band D, with a lot of their properties outperforming the regional average score. During our engagement with the social landlords they flagged that as organisations they were looking to put in place decarbonisation strategies which would further improve the performance of their housing stock, first to a EPC C rating and then to a totally decarbonised level in the future.

To support Social Landlords in this, the Government have run a few rounds of the Social Housing Decarbonisation Fund. This provides funding for the retrofit of social housing to achieve an EPC C level. Social housing is also eligible to receive retrofit measures through the ECO4 scheme.

PRIVATELY RENTED PROPERTIES

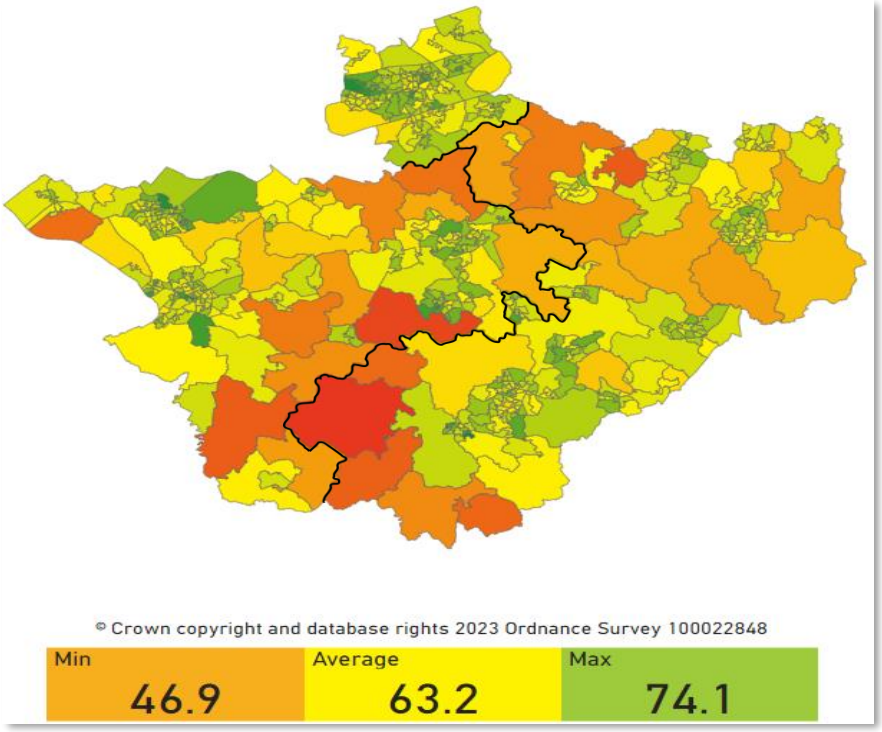
Since 1 April 2020, landlords can no longer let or continue to let properties covered by the MEES Regulations if they have an EPC rating below E, unless they have a valid exemption in place. There is also a 'cost cap' meaning that landlords are not required to spend more than £3,500 (including VAT) on energy efficiency improvements.

Until September 2023, the sector was working towards a more stringent target of EPC C by 2028 with an increased cost cap of £10,000 which was scrapped by the government.

RURAL AREAS

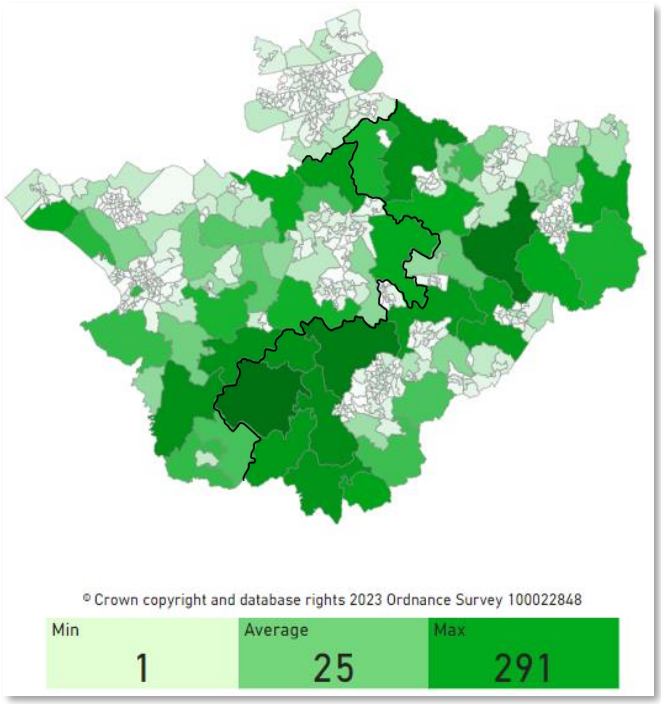
As detailed in the Pathways Report, larger more rural LSOAs tend to have a lower average EPC score. This is because they are likely to be larger, detached and more likely to be reliant on non-mains heating sources, such as oil and LPG.

Figure 7.4 Average EPC score per LSOA in Cheshire and Warrington



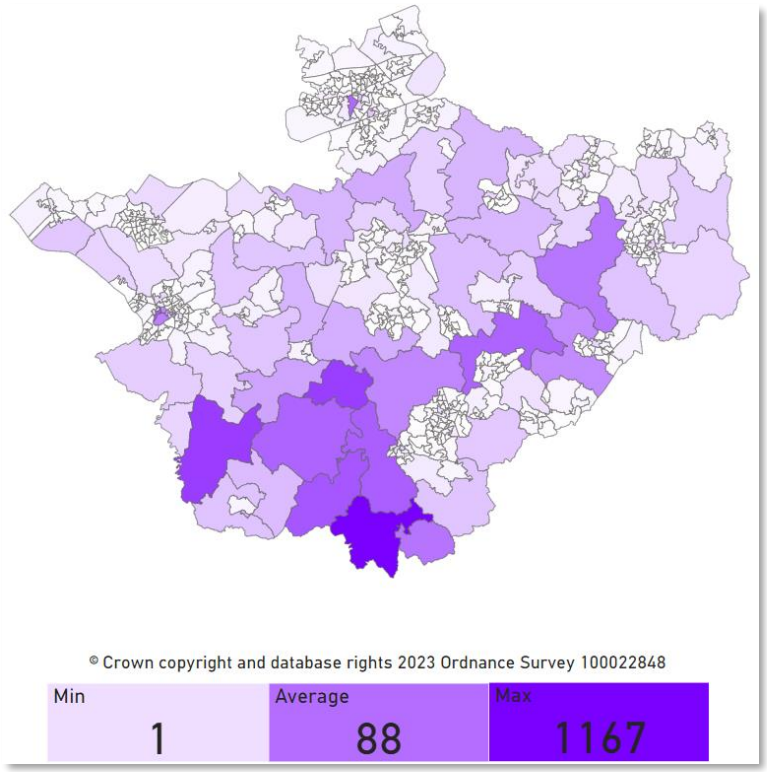
Similarly, more rural areas have higher numbers of the lowest performing homes.

Figure 7.5 Number of F &G rated properties per LSOA in the Cheshire and Warrington region



There is some alignment with the presence of the gas grid. The figure below shows homes that do not use mains gas heating. They include electric, LPG, solid or community heating systems:

Figure 7.6 Number of homes heated by non-mains gas means per LSOA in the Cheshire and Warrington region



This overview of historic ECO statistics[45] shows that the take up of measures in the rural areas is down at 14% across GB but it is not possible to point to a particular rural trend in this sub-region.

8. Tackling grouped challenges in Cheshire and Warrington

We explained the concept of grouping the systemic challenges into feedback loops in Section 4. The feedback loops will never be fully mitigated; they will tend towards zero, and other loops may appear as the market matures over time. This chapter sets out the feedback loops identified during our study and how they could be minimised over time to facilitate the establishment of a maturing retrofit market with increasing productivity over time.

It is critical to take the position that not every initiative will work first time, so the key is to try, fail, learn, try, fail, learn as quickly as possible. Each of the feedback loops set out below are cross-tenure unless where indicated.

Recommendations are split into the following phases:

Table 8.1 Recommendation Phases

Phase 1	Can be instigated immediately and build on existing delivery mechanisms in the sub-region.
Phase 2	Would build on or change existing delivery mechanisms
Phase 3	Initiatives requiring more complex approvals and development.

For clarity, any considerations around the launch of delivery programmes/schemes that would benefit from the grouped challenges having been resolved are dealt with in Chapter **Error! Reference source not found.**.

GC 1 - STRATEGIC RETROFIT PROGRAMME

The National Retrofit Strategy published by the Construction Leadership Council[46] modelled the remaining work to be carried out on housing to be worth £540bn in capital value alone.
It also set out 'interlocking components' that must be in place. Should any one of those components not exist within the national model, then the whole model will fail. One of those was the need for a National Retrofit Programme and a central, convening 'hub' provided and overall context for delivery, filled the gaps in technical capability and decision-making knowledge to enable regional progress.

In both the national context, and the Cheshire and Warrington sub-regional context, housing decarbonisation has not been taken seriously enough to warrant the governance structures, clarity of direction that its monetary value and impact deserves. This is a long term, major project with high technical and logistical complexity. The table below compares national and sub-regional projects with the retrofit challenge identified in the Pathways analysis:

Table 8.2 Comparison of national and sub-regional projects

National context	Cheshire and Warrington context
Housing Decarbonisation to 2040 Estimated value: **£540bn** capital works value	**Housing Decarbonisation to 2040** Estimated value: **£9.2bn**
High-Speed 2 (HS2): Estimated Value: Estimates exceed **£200bn** Description: HS2 is a high-speed rail project connecting major cities in the UK, with the aim of improving rail capacity and connectivity.	**Mersey Gateway Bridge:** Estimated Value: Over **£1.8 billion** (including the construction and operation) Description: The Mersey Gateway Bridge, completed in 2017, is a significant infrastructure project that connects Runcorn and Widnes over the River Mersey.
Hinkley Point C Nuclear Power Station: Estimated Value: **£32bn** (as of the latest available estimate) Description: Hinkley Point C is a major nuclear power project in Somerset, providing low-carbon electricity.	**Omega Warrington:** Estimated value: over **£1bn** Description: Omega Warrington is a large-scale business park and development site, strategically located at Junction 8 of the M62. Commercial, residential, and infrastructure projects.
Crossrail (Elizabeth Line): Estimated Value: **£17.6bn** (as of the original budget) Description: The Crossrail project involves the construction of a new railway line connecting east and west London.	**Warrington Western Link:** Estimated Value: **£212m** Description: The Western Link project involved the construction of a new road to enhance connectivity in west Warrington, linking the A56 Chester Road to the A57 Sankey Way.
Heathrow Airport Expansion (Third Runway): Estimated Value: **£14bn** (as of the latest available estimate) Description: The expansion of Heathrow Airport involves the construction of a third runway to increase capacity.	**A556 Knutsford to Bowdon Improvement:** Estimated Value: Approximately **£192 million** (as of completion in 2017) Description: The A556 improvement project involved upgrading a key road link between Knutsford and Bowdon, enhancing connectivity and reducing congestion.
Battersea Power Station Redevelopment: Estimated Value: **£9bn** (as of the overall development cost) Description: The Battersea Power Station redevelopment is transforming the iconic power station site into a mixed-use development.	**Chester Northgate Development:** Estimated value: **£75m** Description: The Northgate Development in Chester is a major regeneration project aiming to transform the city centre. It includes new retail, leisure, and residential spaces.
Thames Tideway Tunnel (Super Sewer): Estimated Value: **£4.2bn** (Tideway Project overall cost) Description: The Thames Tideway Tunnel is a large-scale sewer project to address overflow discharges into the River Thames.	**Warrington West Station:** Estimated Value: **£20.5m** Description: The construction of Warrington West Station aimed to improve rail connectivity in the western part of Warrington, providing a new station for residents.

Professor Bent Flyvjberg, Professor and Chair of Major Programme Management, Saïd Business School, University of Oxford has been working with a team that seeks to distil the key attributes of successful projects. They have looked at 16,000 building and infrastructure projects from 20+ fields in 136 countries. Only 8.5 percent of projects finished on time and on budget, and a tiny 0.5% achieve cost and time budgets whilst also achieving the benefits expected. The hallmark of all failed major projects is that they 'acted fast and think slowly'. The key message is that the less proven something is, the more it must be tested and that testing can take place in the planning stage where imaginative leaps are best made. In the domestic retrofit sector, the habit has been to scrabble for funding as it appears and seek to spend it as quickly as possible i.e. the exact opposite of characteristics of the best major projects.

The key for Cheshire and Warrington would be to compare and contrast possible retrofit delivery programmes for the region, as far into the future as possible, across all tenures and seek to commit to longer term pilots and projects. There will be synergies between them and with existing mechanism in place in the private and public sector activities. Such vision and commitment will encourage householders to start to believe this is coming, and local business to invest in training and equipment to align with the opportunity. During our discussions with stakeholders, we heard examples of smaller scale schemes such as which provide small scale energy efficiency measures such as low energy lightbulbs/loft insulation for properties as well as the Sycamore development of low carbon housing. Going forward, there is a need for more examples of the later, larger scale project for example the development whole house plans with accompanying retrofit programme to ensure each property is retrofitted in the most efficient way. Examples of this from around the UK include CommuniHeat, which worked with a rural village in Essex to create a bespoke whole house plans for every house in the village and the local DNO to combine this into a local area energy plan to establish the most cost-effective area based approach.[47]

The Greater Manchester Combined Authority (GMCA) Retrofit Taskforce was launched in 2021 to meet Greater Manchester's challenge of retrofitting over 880,000 homes whilst ensuring it maximised the job opportunities in the region. The taskforce brought together partners, including Parity Projects to create the GMCA Retrofit Action Plan[48] which sets out GMCA's retrofit activities for three years from January 2022. As part of this they identified three key priority areas; Boosting Skills, Improving access to funding and finance and Speeding up delivery.

Following its launch, GMCA has launched a number of initiatives including the Your Home Better scheme for the willing to pay market, providing a non profit, independent service which provides advice throughout the whole retrofit process. The scheme provides households with a single point of contact throughout the retrofit process and access to a retrofit coordinator if they agree to go ahead with a retrofit project. This is funded through fixed costs at the start of the process for an initial visit/ the creation of insulation specifications and then a 5% project charge applied to the total cost of the retrofit project.

In addition to this, they have also created:

- An online Retrofit Portal which for residents to apply for the energy efficiency schemes running in the region.
- The set up of a Green Skills Academy/ running of Green skills bootcamps.
- A partnership with the Green Finance Institute to research and trial innovative funding solutions for the willing to pay/ private rented sector.

Whilst the retrofit of stock has been slower than planned, a higher proportion of Greater Manchester homes improved their energy efficiency in 2022/23 compared to previous years.[49]

In a similar vein to the GMCA's approach, the Cosyhomes Lancashire collaboration administered by Blackpool Council has created a central web platform/ helpline. This provides residents with a central portal to access information on eligibility criteria and a centralised location to apply for government funding for retrofit. It also enables website users to access details of the installers conducting work through the schemes for them to independently verify the identify of anyone visiting their property to complete retrofit work. Through creating this centralised portal for the whole county, the participating local authorities have been able to deliver support to their residents at a reduced cost compared to working up their own individual support platforms for their local area.

Table 8.3 GC1 Recommendations

	Phase 1
GC 1-1	To convene a formal Housing Retrofit Steering group to commission a sub-regional housing retrofit programme. Any local organisation benefitting from existence should be involved i.e. all those with first or second order outcomes from improved housing and the increase volume of work e.g. Health, Economic Growth, Social Care, Education, Climate Change etc. This group would set out the governance required to deliver housing decarbonisation (one of many benefits to housing retrofit) by 2040 and could evolve to become the commissioning client for all housing retrofit in the sub-region.
GC 1-2	Agree on the metrics by which the sub-region should measuring itself such that management structures, procurements etc will set out performance criteria, and critically, that the FL6 – Data programme is sufficiently informed on the work it needs to do.
GC 1-3	An initial Housing Retrofit Programme document would include: a. Clearly defined and measurable objectives that align with the organization's overall strategy. b. Identification of stakeholders and their roles. Strategies for effective communication, engagement, and management of stakeholders throughout the project lifecycle. c. Multiple scenarios for deployment to accommodate the changing project parameters such as Government grants, cost of living, cost of finance, inflation, resistance to change etc. This programme would never be static, as works are carried out on homes and data is collected and updated.
GC 1-4	Carry out a Local Area Action Plan within which this Retrofit Programme would need to exist and the modelling for change. An understanding of the local capacity for generation and distribution of electricity is critical to all forms of energy use.
	Phase 2
GC 1-5	Start the maintenance phase of the Housing Retrofit Programme using progress data and a re-framing if required based on changing funding streams and priorities.

GC 2 - WORKING CAPITAL

This is relatively straightforward to define; there needs to be sufficient funding to resource all of the components required to drive the market. If this is attempted with short term grants using understaffed teams, the support will be insufficient, the results not understood and shared, and the combination of elements that make the whole model will not work.

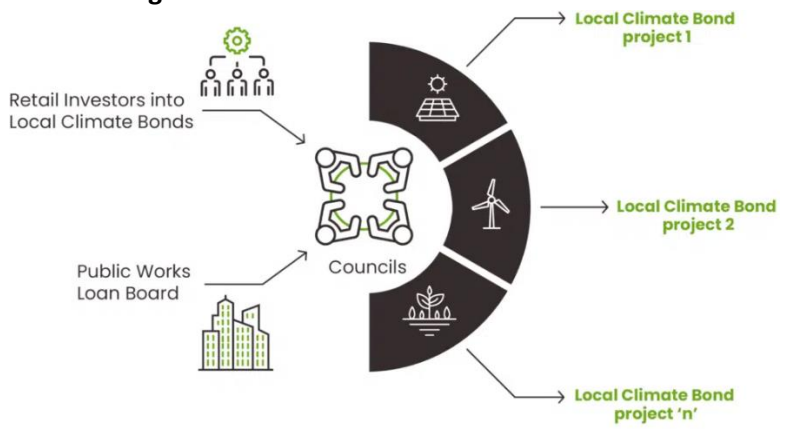
Some examples of where funding could be raised are:

- **UK National Infrastructure Bank**, has been instructed by HM Treasury through a letter from the Chancellor[50] to support Local authority led retrofit programmes to support the delivery of the government's Heat and Building strategy. UKIB offers local authorities up to 50-year loans at a basis rate potentially lower than the Public Works Loan Book. UKIB is also building capabilities for place-based infrastructure projects. It is currently under pressure to support local authority -led projects and could deployment projects at the £5m level if asked to do so.
- **Public Works Loan Board** is a lending facility is operated by the UK Debt Management Office (DMO) on behalf of HM Treasury, providing loans to local authorities, and other specified

bodies, from the National Loans Fund, operating within a policy framework set by HM Treasury. This borrowing is mainly for capital projects. From November 2012, the government introduced the Certainty Rate which reduced the PWLB standard interest rate by 20 basis points (0.20%) on loans from PWLB to principal local authorities who provide information as required on their plans for long-term borrowing and associated capital spending. From April 2018, the government introduced the Local Infrastructure Rate which applies an interest rate of the gilt yield plus 60 basis points (0.60%) for lending to support nominated infrastructure projects that are high value for money. From June 2023, the government introduced the HRA rate which applies an interest rate of the gilt yield plus 40 basis points (0.40%). This rate is solely intended for use in Housing Revenue Accounts and primarily for new housing delivery.
Whilst the cost is going up it may come down with a possible change in Government and can be used in combination with other mechanisms.

- **National Lottery funding** through the Climate Action Fund (Energy and Climate) is an option but the timing is unfortunate. Projects led by local partnerships, UK-wide partnerships and single voluntary or community organisations can apply for up to £1.5 million over 2 to 5 years, with most projects awarded £1 million. Minimum grant £500,000. We aim to fund around 8-12 projects with the total available being £8.5 million. The closing date is not fixed but likely to be December 2023.
- **Local Climate Bonds** have the potential to raise millions of pounds for green projects in the UK. They are regulated investment products through Abundance Investments launched by Councils to access cost-effective funding for specific decarbonisation projects, offering local people an opportunity to invest in their area in a way similar to crowdfunding and to make a return from doing so. Warrington Borough Council raised £1 million from 527 investors to help fund the development of a 20MW ground mounted solar system with the addition of 40MW of battery storage located in Cirencester, Gloucestershire. Local authorities are required to underwrite the crowd-funded loans.

Figure 8.1 Overview of Local Climate Boards

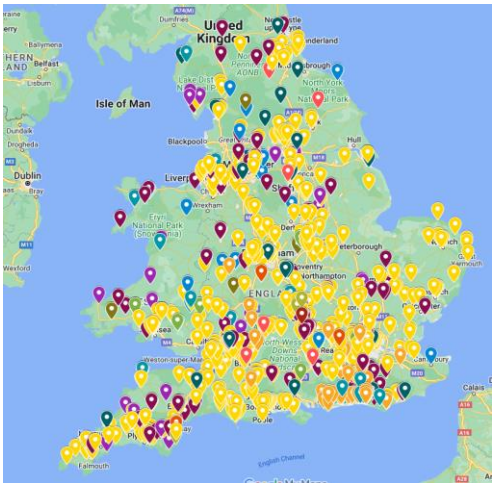


Credit: Green Finance Institute

- **Community Energy Cooperatives** are well known model for raising capital and deploying it for energy efficiency and renewable technology deployment.

DVCE-CP (Dane Valley Community Energy-Congleton Park Ltd) is embarking on a new renewable energy initiative to harness power from roof based solar panels which we will install on schools and commercial properties in Congleton, wider Cheshire and North Staffordshire. The project will reduce energy costs for participating sites including schools as well as provide an educational resource to increase environmental and sustainability awareness. Surplus funds will also benefit local community projects. They are offering a projected 5% return on investment and capital returned over 15 years. You can invest from £100 to £50,000 (institutional investors can invest up to £100,000 seeking to raise £530,000. Previously their hydro scheme has generated 380 MWh of green electricity in under 2 years of operation and has already raised £9000 to community projects.

Figure 8.2 England Community Groups



Credit: Community Energy England

Chester Community Energy has raised capital for and installed a total of 170kW solar PV systems on the Council-owned Northgate Arena Leisure Centre, Christleton Leisure Centre and Neston Leisure Centre, all in Chester.

Lymm Community Energy raised £184K through two community share offers in summer 2015 and 2016. The solar PV systems have generated 668,619 kWh (compared with forecast of 663,741kWh) of clean electricity to the 30th June 2023 and two-thirds of this 448,909 kWh (67% of generation compared with a budget of 65%) has been used by the schools.

Working with communities has multiple benefits for retrofit from building trust raising awareness, deployment of schemes and with community energy, the raising of capital for works.

- **Place-based funding** a lot of recent work has been put into the notion of place-based, off-balance-sheet funding from pension funds. By wrapping in the multiple benefits of retrofit, borrowing could include overarching scheme lending to mobilise the disparate parts of the challenge, whilst offering grants to householders as encouragement to proceed. Living Places CIC has been in talks with all of the major pensions funds who are keen to deploy capital but are waiting to be presented with projects that they deem suitable.

Overall project size would need to be £30-50m+ and would benefit from baking-in the cost efficiencies that would come from a focused area-based approach that would also take-in the improvement of green spaces and other local amenities.

Such a model would need a locally owned Special Purposed Vehicle (SPV) and would generate surpluses for the local community on an ongoing basis to be spent on whatever the community decides is appropriate.

Bristol City Leap is an innovative approach towards decarbonisation at city-scale. The City Leap Energy Partnership is a twenty-year joint venture between Bristol City Council, Ameresco and Vattenfall Heat UK which will enable the delivery of over £1 billion of investment into Bristol's energy system. It is a strong example of one project vehicle pulling together previously disparate strands to create CO_2 savings, local energy generation, a community development fund from surpluses and over 400 local jobs created. It is 50% owned by Bristol City Council and 50% owned by Ameresco.

In addition, the MCS Foundation has been supporting Local Authorities with resources and assistance recently with a view to helping them to understand future opportunities.

Table 8.4 GC2 Recommendations

	Phase 1
GC 2-1	**Stakeholder resources:** Staff in all key partner and delivery organisations need to be in place and have sufficient time and expertise to act on domestic retrofit. It is a common theme across our stakeholder interviews that many organisations would do more, but they have no staff to work on it.
GC 2-2	**Dedicate a resource** to understanding the existing mechanisms and opportunities to align project finding to the sub-region. This will help with communicating opportunities to residents on the sub-region. This resource could be shared across the three local authorities and could be in post to support others to raise money for projects aligned with the overall Retrofit Programme (FL1) or be expert enough to be the lead for raising funding. This post would need to build momentum and would need a minimum of two years to judge progress.
GC 2-3	Work with a **specialist retrofit finance adviser** as a desktop exercise to align the projects outlined in this paper with possible finance options.
	Phase 2
GC 2-4	**Scheme infrastructure:** for the projects identified in FL1, develop a deep understanding of the development required to underpin local retrofit projects at scale and ensure they are communicated back to the funding model.

GC 3 – GENERATING DEMAND

The modelling of approaches ends once the scheme is cast in stone, and the single most important aspect then becomes how many people are willing to take up the offer and engage in work on their property. This section discusses some of the key influences on that willingness.

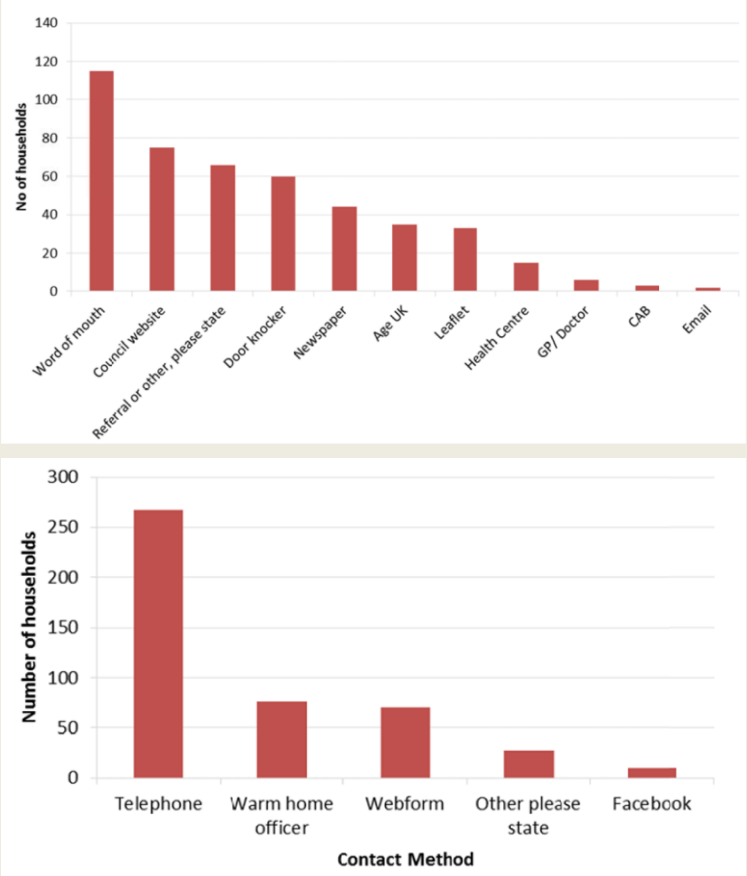
The Energy Efficiency 'Narrative'

This is the projected 'story' of the realisation of the strategy that all boroughs will work towards. It needs to move beyond 'loft insulation and light bulbs' to the gradual upgrading of homes towards a common standard. Any less than this and most people think they have already done most of the work by tackling one small part of the overall. Moreover, it is very common for people living in older buildings to think that they are 'meant to be cold' in deepest winter, and that change is not an option. This myth needs to be dispelled by a strong coordinated communication.

Part of this is ensuring that all advocates and practitioners are informed of the scheme details and the likely benefits, and to be able to 'sell' it in a consistent fashion. If any of these people are not bought into the methodology and the offers, this narrative falls down locally.

As can be seen from the Warm Homes Oldham experience above, most leads came by word of mouth underlining the significance of this narrative.

Figure 8.3 *Warm Homes Oldham* - access routes to the scheme are set out in the 2015 appraisal report:



Local Area Energy Advice Demonstrator projects

To boost the provision of local advocates and practitioners, the Department of Energy Security and Net Zero recently provided funding to 36 projects through the Local Energy Demonstrator Projects[51].Included within these 36, there are two trials operating in and around the sub-region., Pure Leapfrog have recently been awarded funding from the Department for Energy Security & Net Zero under their Local Energy Advice Demonstrator (LEAD) Projects competition, administered by the North West Net Zero Hub to run a programme which looks to engage private landlords to:

- Persuade PRS landlords in Warrington that retrofit is compelling and actionable.
- Develop and test high-quality services that provide retrofit advice and home assessment.
- Provide 167 landlords with retrofit advice and perform 42 retrofit assessments.
- Bring together a "finance round table" of individuals from the financial services sector to explore new green finance products.

Energy Projects Plus are running the 'Retrofit Buddies' project to target hard-to-reach consumers, including those without an EPC, using data from local authorities and referrals from the Integrated Care Board for Cheshire and Merseyside. A 1:1 system of 'Retrofit Buddies' will provide each consumer with a single point of contact. Consumers who receive advice will co-design a Personal Action Plan with their retrofit buddy who they will have regular contact with throughout any installation process. Advice will follow a 'fabric first' approach. As more consumers are reached, a library of materials and case studies will be developed to further promote the advice service.

Advocate Members and Marketing

It is critical to work up a focused message for each market segment, aligned with each of the scheme offers (Section 7) and for that message to be delivered at the right time. One of the key reasons for creating the Advocate Member role as part of the RetrofitWorks membership was to ensure that customer types can be matched up with Advocate members. A first pass review has been carried out for each borough as part of the exercise, but it needs considerably more work to make it useful.

Wider marketing

The residents of the boroughs need to be aware in the first instance that there is a local authority backed movement, and that there are long term goals to meet. Wider marketing is about telling stories of those that have had work done and how beneficial it was.

Part of this is the use of existing Eco Homes in the area that are open for visitors, and RetrofitWorks has many links on that front already.

Focused marketing

Kirklees Warm Zone project (2007-2010) appraisal report section on marketing is copied here as it is all very useful for what has been cited as the best energy efficiency project the UK has seen:

> "There was considerable distrust of the Project early on. People did not believe that their loft and cavity walls would be insulated for free. This was exacerbated by the arrival of several unauthorized Contractors into the Kirklees areas, who cast doubt among residents as to whether the Project was free at all. The problem was made worse by the fact that the Kirklees Project team had initially decided to launch the Project in a low-key manner, so that they would not be inundated with requests to visit householders and have their work done, particularly in areas not being served until the end of the programme.
>
> To tackle these problems, a variety of solutions were found. A marketing programme was developed which had 3 main aims:
>
> - Brand recognition
> - Counteract unauthorized contractors
> - Get the message "free for all" out
>
> A large Bill Board was set up in each Ward ahead of works, and radio and TV became the main route for spreading the word about the scheme. The original team of 3 key officers spent more time in radio and TV studios during the early days than they did almost anywhere else. In addition, assessor and contractor staff were given a "uniform" to wear, namely a distinctive red jacket that gave the Kirklees Project a brand image which people came to recognize and trust. All assessors also carried photographic identification. Local police were informed of which Ward/s the Kirklees Project would be in during a particular time, so that vigilance could be exercised when other Contractor vans were seen in that Ward. Community organizers and other lead people were contacted before a Ward was targeted to make sure they would be able to spread the word about the forthcoming work being carried out. Local events and prize draws were also held to raise awareness.
>
> If householders remained reluctant after a home assessment visit, they were returned to near the end of their street's installation program. Many agreed at that point. Those remaining were contacted again by letter near the end of the 3-year Project, and offered the package once more. By that time, the recession and fuel prices (and probably word of mouth concerning the benefits) meant that more households joined the Project"

The power of Advocate members locally allows any marketing material to be put into the hands of those that need the work and advice the right time, rather than carrying out an expensive marketing push and waiting for the telephone to ring.

Targeting Customers

In March 2013, DECC commissioned IPSOS MORI to carry out in depth interviews with over 3000 people to seek out marketing insights for heating system works.[52] Some key extracts are:

- ***What are the triggers for homeowners considering replacing their current system?*** *A system breakdown was the most common reason respondents had replaced their heating system in the past*

(30% gave this as the main reason). 'Non-emergency' situations where their system was still working but was coming towards the end of its life were also commonly cited as the main reason, either because they were told it would not last much longer (14%) it needed repairs too often (14%) or they were told the parts would no longer be available in the future (3%). The most common reason other than actual or anticipated breakdown was as part of a wider property renovation (13% gave this as the main reason).

- *Most (70%) would only consider a pre-emptive system replacement if their heating system started to need considerable repair/s. This was confirmed by the choice experiment which found that in a non-emergency scenario the majority of survey respondents would opt to do nothing.*

This programme needs to bring in those people responding to emergencies or failures on equipment to spearhead work.

- *Many homeowners with lower incomes, or limited savings, would need information on the financial assistance available to pay upfront installation costs. For those with available capital, who tended to be aged 55 and over, the key information was about any ongoing financial assistance to help reduce annual running costs. Such homeowners were particularly keen to know the new systems' expected annual fuel bill.*

This is useful when forming the final offer.

- *Homeowners did not mention needing information about the suppliers of heating system technologies. They would trust the advice of a boiler serviceman or heating engineer, and would also follow word-of-mouth recommendations from friends and neighbours.*

This underlines the criticality of having Practitioner members at the heart of the customer gathering exercise. Membership of a cooperative, giving them control over this market is an exciting approach that is possibly the only way to make this happen.

This is all very useful intelligence for marketing and underlines the need of many of the offer elements that have been proposed.

Table 8.5 GC 3 Recommendations

	Phase 1
GC 3-1	Once agreement on the development of a Sub-regional Retrofit Programme has been agreed, engage with all feeders and beneficiary organisations to convey the opportunity and to understand receptiveness. This would be best done as a locally based conference. Supply chains to be reached via all trade associations and local contacts.
GC 3-2	Once an overall strategic direction has been agreed ○ Consult and agree on its content with local authorities and Members. ○ Maximize awareness of aims and benefits to all parties. ○ Maximise awareness of the holistic nature of the approach – the grouped challenge mitigations etc.
GC 3-3	Publish the Sub-Regional Housing Decarbonisation Strategy / decide on branding for sub-regional offering (if appropriate)
	Phase 2
GC3-4	Strategic input required into Scheme Marketing to ensure all messages are aligned and customers targeted appropriately.

GC 4 - CARROTS AND STICKS

How far and fast should householders be supported to pushed is a very political area of debate. Here is a review of the mechanisms available at this time that could be maximised in the region:

The Minimum Energy Efficiency Standard

The minimum energy efficiency standard (MEES) was introduced in March 2015 by the Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015 to improve the quality of private rented homes in England and Wales and increase the energy efficiency at the properties.

From 1 April 2018, landlords of buildings within the scope of the MEES Regulations must not renew existing tenancies or grant new tenancies if the building has less than the minimum energy performance certificate (EPC) rating of E unless the landlord registers an exemption. This applies to new and existing tenancies.

Landlords must use their own funding to cover the cost of improving their property to EPC band E. This requirement is subject to a spending cap of £3,500 (inclusive of VAT) for each property and is only necessary when third party funding (such as ECO grant) is unavailable.

Landlords may be able to secure some third-party funding, but it might not be enough to improve their property to EPC band E. In this case regulations stipulate that landlords must top up this third party funding with funding from their own pockets, provided that the combined value is less than the £3,500 (including VAT).

Landlords can register an exemption in order to remain compliant with MEES regulation, despite their property not meeting the standards required. All exemptions last 5 years except the exemption: recently becoming a landlord, which lasts for only 6 months. Unlike an EPC that stays with a property, an exemption does not. It is linked to the landlord who registered the exemption, so if a new landlord comes into the property, they will need to re-register the exemption.

The penalty for renting out a property for a period of fewer than three months in breach of the MEES Regulations will be equivalent to 10% of the property's rateable value, subject to a minimum penalty of £5,000 and a maximum of £50,000. After three months, the penalty rises to 20% of the rateable value, with a minimum penalty of £10,000 and a maximum of £150,000.

In 2021, the government issued a consultation on future updates to the MEES regime, which foresees raising the minimum energy efficiency standards for let buildings being increased to C by 2027 and to B by 2030. The expectation was to

1. raise the energy performance standard for properties within the scope of MEES regulations to an energy rating of 'C' for new tenancies granted from 2025 and then to all existing tenancies from 2028.
2. increase to £10,000 the maximum amount landlords of sub-standard property are required to invest to improve the energy performance of their properties.

However, these additional changes were scrapped by the Prime Minister in September 2023.[53] At the time of writing there was no indication of whether these will be reintroduced in the next parliament.

Measure-specific policies

To help the transition the Boiler Upgrade Scheme introduced by government provided grants of between £5,000 – £6,000 (depending on the system) for qualifying owners of property when upgrading to a heat pump system. It was proposed that all boilers needing replacement would have to switch to a heat pump system from 2035. While the installation of oil and LPG boilers for off-gas grid homes were to be phased out from 2026. However, recent changes to these policies were announced by the Prime Minister in Autumn 2023.

- Qualifying households will be able to apply for an exemption to the requirement to switch to a heat pump system when replacing a fossil fuel boiler. It is expected that this will apply to those that will find it most difficult to transition.
- The ban on oil and LPG boilers from 2026 has been delayed until 2035 for off-gas grid homes.
- Grants available pursuant to the Boiler Upgrade Scheme are to be increased up to £7,500 to assist with the transition to a low-carbon alternative heating system.
- Immediately prior to this announcement, DESNZ launched a consultation[54] on how to change the Boiler Upgrade Scheme including whether the grant level should vary in different circumstances such as the fuel type the new heating system is replacing and whether to remove the need to have an EPC which shows sufficient cavity/ wall insulation has been installed and
- Further detail is awaited following the announcement. Local authorities, property owners and business will need to continue to aware of the evolving situation especially as it may change again depending on the outcome of the next General Election.

There is an indication that there may be move to ban gas boiler installations in existing homes from 2035 but this cannot be relied upon. This situation needs to change or householders will not seek to change their spending decisions and the supply chain will not seek to retrain.

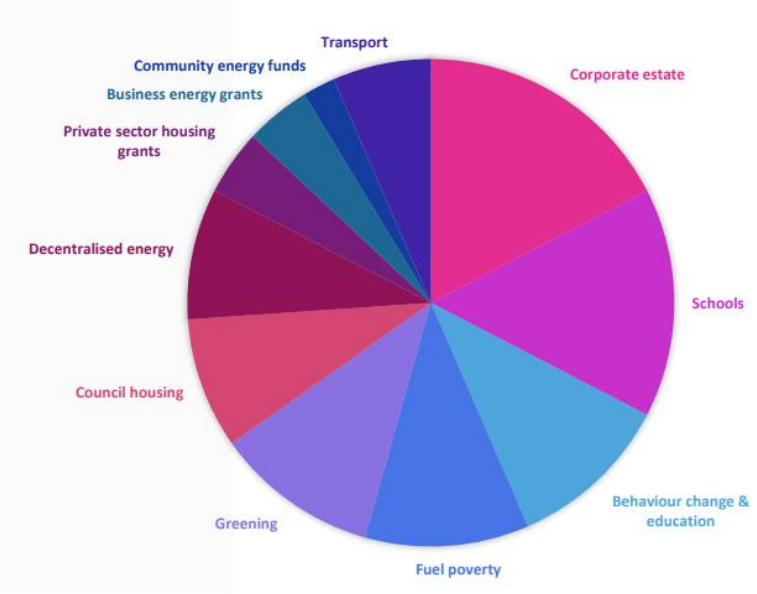
Government announcement
At the time of writing, the government announced a further allocation of £6 billion to cut energy use and bills.[55] Details of how this will work are currently sparce but the announcement highlighted:

- A further £1.5n for the Boiler Upgrade Scheme
- A new £400 million energy efficiency grant to be launched in 2025 for households to make changes such as bigger radiators or better insulation
- A new local authority retrofit scheme, allocated £500m to support up to 60k houses
- An extra allocation of £1.25bn for the SHDF
- Green Heat Network fund, allocated £485m for new heat networks
- An allocation of £45m for the Heat Network Efficiency scheme to upgrade 100 existing heat networks.

Table 8.6 Overview of retrofit Incentives

VAT rate reductions (Link)	Currently VAT can be applied at either 5% or 0% when certain energy-saving products are installed in a home. 0% VAT cab be applied to both: • certain products supplied by an installer • the cost of all work to install those products in a home To complicate things, if the cost of the products (not including VAT) is 60% or less of the total cost of the installation (not including VAT), a customer pays 5% VAT on everything. 5% VAT on heating equipment work funded through an energy efficiency grant if eligible. • installation of heating appliances • installation, repair and maintenance of central heating systems • installation, repair and maintenance of renewable source heating systems You pay 20% VAT for:

	• heating equipment that is not funded through an energy efficiency grant • energy efficient boilers • secondary or double glazing • low emission glass • energy efficient fridge freezers If the products cost more than 60% of the total cost of installation, you'll only pay 5% VAT on the labour. You'll pay the standard rate of 20% VAT for the products.
Carbon Credits	Currently only applied to the social housing, 'Retrofit Credits' are financial incentives offered by HACT and Arctica to encourage Registered Providers (RP) of social housing and landlord property owners to retrofit homes. Providers can access the significant pool of capital that organisations, businesses and corporates are investing in emissions reduction projects. As part of their decarbonisation plans, buyers of credits from across the economy invest in emission reduction projects both within and outside their supply chains. Retrofit Credits introduces a way for these organisations to channel some of this investment into housing retrofit and support the social value these retrofit activities give to residents of those homes. Using the UK Social Value Bank, Retrofit Credits demonstrates how retrofit reduces emissions and creates social value for residents and communities. Retrofit Credits is also certified by the Verra Registry, the pre-eminent carbon crediting organisation in the world under the Verified Carbon Standard and is only the second certified Verra project in the UK, as well as the first accredited emission reduction project for housing retrofit in the world and the first to offer organisations a mechanism to invest in the local communities of their customers, employees and stakeholders in the UK.
Carbon Offset Funding	The Greater London Authority (GLA), in its London Plan policy requires all major new development to be net zero-carbon by achieving at least a 35% on-site reduction beyond Part L of Building Regulations and to offset any remaining emissions. On-site reductions should be maximised as far as possible before the offset is applied. If the GLA is satisfied that the development has maximised on-site reductions, but the development is still falling short of achieving net zero-carbon, the developer is expected to make a cash-in-lieu contribution to the relevant Local Authority's carbon offsetting fund. Each London Local Authority ensures that: • set up a carbon offset fund that is ring-fenced to secure delivery of carbon savings within the relevant LPA. • set a price for carbon, i.e. price per annual tonne of carbon, that developers pay to make up any shortfall in on-site carbon savings, securing contributions through Section 106 agreements. • identify a suitable range of projects that can be funded through the carbon offsetting fund. • put in place suitable monitoring procedures to enable reporting to the GLA. In the period October 2016 to 2020[56] , local authorities in London secured £57.5m of carbon offset funding and a range of retrofit-related projects have

	been funded, see below for the split. In some instances e.g. Merton and Haringey, funded have been merged with ECO funding to ensure even the smallest jobs are viable for a contractor to carry out.  The implementation of such a scheme would need to be balanced with additional support offered to property developers, who will be paying into this fund so that would not be tempted to invest elsewhere. The smart approach would be for this to be a regional-wide initiative.
Carbon Insetting	Oxford City Council is leading a project to trail area based Carbon Insetting within their region.[57] Area based insetting encourages organisations to invest and support local carbon saving or environmental projects which directly benefit their local area. This project is still in its discovery stage so is yet to progress to actual deployment at time of writing.

Possible future mechanisms

Council Tax rebates	A mechanism to rebate council tax should certain retrofit targets be met has never been attempted in the UK. Moreover, given the precarious nature of local authority finances it is unlikely that this is something that would be trialled soon. However, mechanisms such as these are within the decision-making sphere of a local authority and should a direct relationship between local retrofit and multiple others benefits to the local authority, an evidence base would be created to support a pilot.
Stamp Duty Rebate	Turning the existing Stamp Duty Land Tax into an Energy Saving Stamp Duty incentive has the potential to drive a long-term sustainable market for energy saving home upgrades, giving certainty to businesses and empowering consumers giving them choice to upgrade a new or existing home: • A better energy performing home would attract a lower stamp duty. • Energy performance improvements made within 2 years of purchase trigger a rebate. Catalyses significant growth – underpins an owner occupier low energy retrofit market of circa £17Bn pa and 300,000 new jobs covering every part of the UK. Embeds a home's energy performance in the wider discussion about financing the purchase alongside other improvements the homebuyer may be considering. could be revenue neutral for government or could allow Stamp Duty to taper out altogether, over a decade or two. It is being pursued by The Energy Efficiency Infrastructure Group (EEIG), a collaboration of leading industry and trade bodies and consumer groups, think tanks, environmental NGOs and major engineering, energy, construction and insulation businesses. A recent public opinion poll for Government showed 78% support of the policy but requires leadership to implement it. There is no indication of whether any future government would drive it forward.

Table 8.7 GC4 Recommendations

	Phase 1
GC4-1	Raise awareness with regard to VAT opportunities to reduce cost amongst the SME community. This would need to stop at the point of offering tax advice as each job would need to be judged on its own merits by a tax adviser, however, it might be possible to hold a register of such advisers. This could be tied to the communications recommendations in FL2.
GC4-2	Scope the appetite amongst elected members for a range of incentives and regulatory nudges that could be added to the local authority landscape.
GC4-3	Ensure any early sight of central government policies are fed into the Housing Retrofit Programme so that any decisions take account if them.

GC 5 – THE FUNNEL OF DEATH

This title is intended to attract attention and highlight something that has happened time and again; the picking of narrow projects and hoping that an entire market will magically appear as a result of it. This does not necessarily apply to all areas of housing; the social housing sector has tried and tested ways of working, dedicated asset management staff and steady income to pay for work and as a result has higher than average EPC scores.

Outside of this, private rental and owner-occupied sector industry works in silos with varieties of motivations and levels of understanding and need a framework of operation of a 'scheme' within which they will recognise their role and links to other providers, managed on their behalf. A scheme could focus on a particular cohort to homes with a customer journey designed appropriately to attract homeowners and a supply chain to service them.

The Green Deal attempted this but missed some fundamental components.

A brief review of the Green Deal

There is some local concern that there is initiative fatigue within both the supply chain and amongst client and community organisations with regard to domestic retrofit, in particular as a result of the poor response from householders to the Green Deal. Any new programme has to address all elements of that reticence if it is to cut through the fatigue.

The table below sets out each of the elements of the Green Deal (2012 to 2015) and how this programme could seek to address them.

Table 8.8 Green Deal Failure

Green Deal failure:	Addressed by:
1. High interest rate (minimum 6.9% APR)	**Impartial financial advice will help customers to select finance appropriately. If a mortgage extension is most appropriate then that guidance can be given.**
2. The Golden Rule	This rule sought to ensure that the regular finance repayments were never greater than the energy cost savings made on the works. The intent was to protect consumers from higher energy bills, and to protect investors from a higher risk of default on the bill. The reality was that this rule meant that a package rarely included more than the simpler measures such as loft insulation and boilers – which the client could finance themselves without the Green Deal. **The intention would be to give expert energy and building advice and allow clients to choose what they wish to spend money on.**
3. Poor range of market offers.	Nearly all offers to the general public were very similar due to the controls set by the code of conduct and the limitations on the advice that were set. **A scheme should set out some attractive offers as the starting point and build the local practitioners to deliver them.**
4. Numerous home visits before the final offer was made.	A large number of specialists were required to arrive at the type of package the client preferred even before a range of contractors would visit to provide quotes. **The right adviser can give impartial advice on the best approach for a client, and then offer three estimates and finance options at that time.**
5. Was not supported with any regulatory nudges	The offer was in place, but there were no complementary 'pushes' from aligned processes such as building control, planning, stamp duty fees etc. **Whilst changes in this space are hard to achieve a new scheme should seek to inform and train the personnel within such services to support the project and make recommendations to customers.**
6. The was no big marketing push	There was (and remains) a lack of awareness amongst not only the general public but even within the construction industry. **Any new scheme should utilise smart routes to communicate with customers and industry through its stakeholders.**

Green Deal failure:	Addressed by:
7. A disjointed and untrusted supply chain that had not bought-into the mechanism.	Consultation on the scheme options did happen, but it was larger organisations that drove the agenda and those at the 'coal face' felt detached from decision making. This was not motivational and their views permeated the scheme to its detriment. The industry felt like the scheme was imposed on them **Create a model that gives everyone on both sides of the market a fair level of influence and genuine ownership to create a model that works for all.**

The following section sets out some examples of retrofit programmes that were funded by a BEIS grant.

Cosy Homes Oxfordshire

Led by Low Carbon Hub in Oxford as main (local) partner convener of around 20 community groups across the county. Local partners decided on the Cosy homes Oxfordshire brand, and the scheme launched to customers in April 2019. The graph below shows income since Jan 2021.

RetrofitWorks provided the supply chain, the customer-facing team and Retrofit Coordinators. National Energy Foundation provided a call centre. Scheme promotion is directed by Low Carbon Hub and delivered in partnership with a range of community organisations across the county.

Customers access the programme by creating a retrofit package on free-to-use software. This utilises the Parity Projects Plan Builder software which already has an energy model for every home in the county. By using it, householders understand the cost and benefit of retrofit for their home, and once they have selected a package, the administration team have an understanding of the intention.

Thereafter, customers pay for the remaining stages:

- Customer buys a Whole House Plan (WHP) which sets out the strategic mix of measures to improve the performance of the home. This is based on a detailed home survey and then production by a Retrofit Coordinator. Circa £400 per report.
- Building Performance Report (BPR) – document that sets out the detailed requirements of the work. The content of the report varies with the complexity of the project. Customer is charged.
- Installations - 10% of the value of the work is charged by the scheme as the main source of income. CHO charges 5% to contractors, 5% to the homeowner.

The WHP and BPR delivery started immediately, but due to the challenge of growing the local supply chain, the pace of installations took 18 months to start in earnest. The scheme moved to profit from January 2022 and no longer needs external support. It is the first scheme that has achieved self-sufficiency in the UK.

Figure 8.4 Cosy Homes Oxfordshire – Income Actual vs Projects

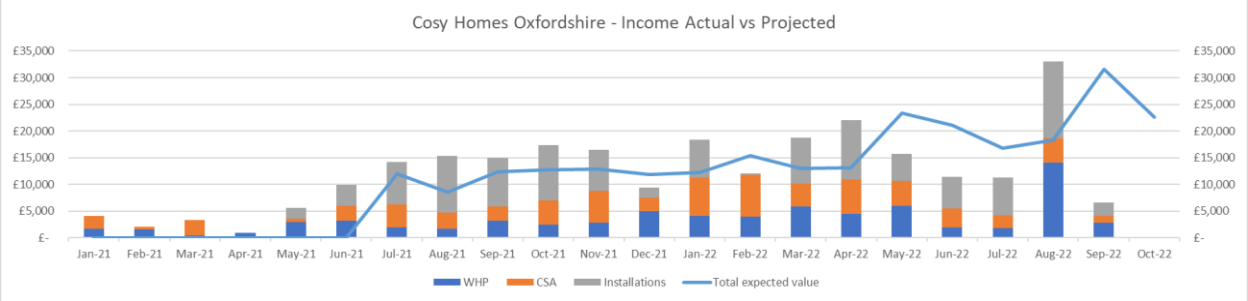


Table 8.9 Lessons learned from Cosy Homes Oxfordshire

Lessons from CHO to pass to other schemes:		Improvements required for any new scheme:
The initial offer was made with no firm supply chain in place – it was built over time – this delayed the ability to install.		Cover all possible measures with the supply chain from day 1
The offer was very wide and not targeted at particular customer areas.		Target certain job types at first, then widen
The offer covered the whole county from the start - meaning a lot of cost was built in travel before income was steady.		Commence in one or two parts of the county with a focused offer, then widen
No local authority involvement at all		Involve Local Authorities and Community Groups to build the brand

Warmer Sussex

This scheme was designed, led and delivered by RetrofitWorks in conjunction with BHESCO and Citizens Advice (East and West Sussex) and was launched in November 2019. The customer journey adopted was similar to CHO the only change being that the whole 10% fee at installation stage was charged to contractors.

It was decided to mothball the scheme until local authorities are in a position to support the scheme not just from a brand-association perspective but also to support the long-term growth of the local supply chain.

Table 8.10 Lessons learned from Warmer Sussex

Lessons from Warmer Sussex to pass to other schemes:		Improvements required for any new scheme:
The initial offer was made with no firm supply chain in place. The supply was very hard to create indeed and at no point was it concrete.		Cover all possible measures with the supply chain from day 1 and have sight of growth over time before launching the offer.
Local advocates organisations didn't effectively support the initiative. Community organisations were not good at collaborating and were quite territorial, so promotion and ongoing messaging was inconsistent and undermined faith. In addition, there was not		Involve Local Authorities and Community Groups to build the brand. Ensure that at least one of those sets of advocate groups has complete buy in and a stake in the success of the scheme.

active support from local authorities due to lack of resource.		

Ecofurb (London)

Ecofurb was designed and is led by Parity Projects, with RetrofitWorks as delivery partner. Launch was timed to coincide with the launch of the free-to-use homeowner 'Plan Builder' software, in September 2020. The customer journey/model has been similar to Cosy Homes Oxford, outlined above, with the main difference being that the contractor paid the full 10% rather than splitting it with the homeowner.

Customer demand has been high with relatively little marketing. There have been considerable challenges building a supply chain to meet the offer. Recently, Ecofurb streamlined the offer to advice services, and referrals for renewables. The aim is to reach profitability faster, while evaluating the best way to build back to fuller support for 'willing to pay' customers in London.

Table 8.11 Lessons learnt from Ecofurb

Lessons from Ecofurb to pass to other schemes:		**Improvements required for any new scheme:**
The supply chain in London had been working effectively with RetrofitWorks on grant funded work and expressed interest in 'willing to pay' but particularly insulation installers have struggled to adapt.		Seek contractors that work on able to pay projects. To begin delivery, build solid relationships with one to three contractors for each key measure/covering the key measures and build the contractor base from there.
The offer was wide. It was ambitious from day one, offering multi measure and deep retrofit, extensions and major refit. This involved adapting the model and varied challenges, both meaning learnings were slower.		Target certain job types at first, then widen. Concentrate on energy efficiency installations unless a convincing partnership with general build contractor/s can be built. Be aware of the balance between a simple solid offer and responsiveness to the market. Respond where there is little adaptation/time loss.
The offer covered the whole of Greater London from the start, and responded to enquiries outside London with advice-only. This meant that time was spent on travel, and contractor coverage was thin.		Start in one or two parts of the county with suitable housing stock and good contractor coverage, and then widen.
Little engagement with community groups. As a BEIS pilot an area Ecofurb trialled was a mainly online acquisition route. This failed to make use of trusted community networks.		Involve community groups to build the brand and get the word out.
Promotion via Local Authorities was successful.		Use local authority promotional channels.

FutureProof (Bristol)

The project is led by CSE with the Green Register and council partners. Futureproof aimed to offer services without an 'end to end' customer journey. Currently homeowners can choose from services including thermal imaging, whole house plans, and inspection by a Retrofit Coordinator of works done. Futureproof support the supply chain with training offered by the Green Register.

The BEIS evaluation of pilots included the issues met and some potential learnings:

Table 8.12 Lessons learned from Futureproof

Lessons from Futureproof to pass to other schemes:		Improvements required for any new scheme:
Contractor sign up to the courses offered could be considered low.		One contractor respondent to the BEIS evaluation interviews suggested formal accreditation of courses could help.
Hard to attribute work done to the efforts of the project.		In the absence of an end to end journey have good post-engagement follow up.
Becoming a FAB (Futureproof Associate Builder) doesn't include becoming Trustmark or PAS30. So for those contractors entering the retrofit market, they weren't able to access grant funded work.		Support contractors through the complicated accreditation landscape. However, note learnings in London about the types of contractors suited to grant/able to pay for some measures.

People Powered Retrofit (Manchester)

Led by Carbon Co-op and Urbed. There is a 5-step customer journey, with PPR offering a whole house plan, support with contracting installers, and access to Retrofit Coordinator services during works. They have a network of contractors but take no role in taking any responsibility for them.

The BEIS evaluation of pilots included the issues met and some potential learnings:

Table 8.13 Lessons learned from People Powered Retrofit

Lessons from People Powered Retrofit to pass to other schemes:		Improvements required for any new scheme:
Some homeowner respondents to the BEIS evaluation interviews cited slow progress and communication through the customer journey.		Ensure that customers are kept informed. Understand lead times and communicate them.
Higher price for the whole house plan earlier than other pilots.		Fix a cost for the initial advice services that allows for slow customer progression to the next step.
Some homeowner respondents to the BEIS evaluation interviews cited technical language and other barriers to understanding the whole house plan/report.		Have layperson input when designing customer facing documents.

Your Home Better (Manchester)

This scheme, procured by Greater Manchester Combined Authority in April 2023, is a one-stop-shop offer to the willing to pay sector across the Greater Manchester footprint. It makes use of the Plan Builder tool (link) as an entry point for householders to get immediate advice on their home retrofit, leading into a process of paid retrofit advice in the shaped of a Retrofit Coordinator and a Whole House Plan. That plan can be enacted with a vetted supply chain and the Your Home Better team making sure the client is supported every step of the way.

The project is led by the RetrofitWorks cooperative and the intention was to lift all of the components of the Cosy Home Oxfordshire programme. Your Home Better as been very slow to launch due to the lack of local, appropriate contractors willing to work within the working arrangement, and a very large proportion of customer approaching the scheme are in need of finance to move forward.

Further findings will be published as the scheme progresses but their volumes of work are increasing and adaptation from the Oxfordshire model are starting bear fruit.

International review

Government carried out a review of international supply chains[58] and drew the following conclusions:

Table 8.14 Lessons learned from International Schemes

Lessons from International Schemes		Improvements required for any new scheme:
The retrofit sector is currently fragmented with works being conducted by separate trades leading to a lack of responsibility		The scheme needs to include function to oversee work, ensuring work is completed to quality and assurance standards. Thought needs to be given on how best to quality control sub contractors in the process.
There is a fragmentation in a contractor base which has lack of interest in changing its focus. It also has a limited capacity to sell measures to households		The scheme needs to highlight benefits of refocussing on retrofit and how best to sell measures to households.
Training is fragmented and narrowly limited organisationally and geographically.		The scheme needs to link into a wide, coordinated training network which focuses on the needs of the market
Consumers are not interested in energy efficiency for its own sake, they are interested in improving their home		The scheme needs to sell the wide ranging benefits of retrofit in relation to how it can improve a home, increasing comfort and saving money, utilising trusted partners to engage communities.

Scotland

At the time of drafting, the Scottish Government is consulting on a range of measures to decarbonise the housing stock in the county ahead of the UK target of 2050[59]. These measures include:

- Prohibiting the use of 'polluting heat systems' such as gas and LPG boilers after 2045.
- Introduce a new law that will require private landlords to meet a minimum energy efficiency standard by the end of 2028.
- require homeowners to meet the same minimum energy efficiency standard by the end of 2033.

Details of the exact nature of minimum energy efficiency standards and how the above would be enforced are yet to be finalised with the consultation due to close in March 2024.

Ireland

The Irish 'National Retrofit Plan', which was published as part of the Climate Action Plan in 2021, sets out how the government will deliver on retrofit targets. The Plan sought to address barriers to retrofit across four key pillars: driving demand and activity; financing and funding; supply chain, skills and standards; and governance.

The key measures include:

- a new National Home Energy Upgrade Scheme providing increased grant levels of up to 50% of the cost of a typical deep retrofit.
- One Stop Shops to offer a hassle-free, start-to-finish project management service, including access to financing, for home energy upgrades.

There are no official reports identifying the achievements of the one-stop-shops that have emerged across the country yet, but some are expected soon.

Table 8.15 FGC5 Recommendations

	Phase 1
FGC5-1	Carry out work to detail the most appropriate form on 'one-stop-shop' that would suit the sub-region. (circa £50k)
GC5-2	Put in place one central resource to understand local grant needs and: • ensure all existing sub-regional programmes of all kinds are joined up and are able to find a place for all customers to be channelled and funnelled to take the next step on their retrofit journey. • apply for funding opportunities. • coordinate understanding of KPIs across the sub-region for schemes under way and compare and contrast with other regional projects. • Understand the grouped challenges involved and input into the Retrofit Programme development.
	Phase 2
GC5-3	review FL5-1: • Once FL1 is completed in case of re-focus • Once access to working capital has been explored • Once more DNO-related focus has been provided for prioritization of locality. • Plan for launch
	Phase 3
FGC5-4	Launch a One-Stop-Shop to enabled a full customer journey to be brought to the market for all customer and supply chain.

GC 6 - DATA STRATEGY

At all stages of the 'plan, do, review' cycle, decision-makers are within scope for a review of the data they need to execute the nest job they can.

This is a deep rooted group of challenges that will take considerable time to mitigate as it will require the alignment of a considerable number of stakeholders within the new backdrop of the General Data Protection Regulations (GDPR). Clearly renovation work is happening now, up and down the country, but this lack of clarity when making decisions is something that policy makers, large corporations and households alike continually bemoan. Making decisions with lack of clarity makes room for expensive mistakes, short termism and scammers peddling misinformation.

The financial benefits for improving access to data would need to be identified in detail through further work, but would include:

- Better market engagement through accurate identification of works.
- Accurate calculation of the value of pre-emptive region-wide additional surveys to power the market.
- Advisers will be pre-informed on retrofit options for clients (Building control, Planners, Social workers, GPs)
- Productivity improved across the building sector as every opportunity and trigger point used when they arise due to clarity of planning and clear communication that these are the cheapest moments to carry out works.
- Confidence in the retrofit opportunity rises from accurately informed awareness campaigns and professional supply chain grows and scammers peddling misinformation are marginalized.
- The overall sub-regional retrofit Programme is continually updated as completion data is fed in. Progress is recorded, problems identified, solutions found.

Early in 2023, the Geospatial Commission undertook a review of future opportunities for innovative use of location data related to properties. The review supported commitments to improving the home buying and selling process made in the 2022 Levelling Up White Paper.

- Expanding access to the data will support economic growth, delivery of better infrastructure and essential government functions.
- Data standards are crucial, but in many areas, they can be difficult to work with due to the large number of standards and their complexity. For example, there are a huge number of environmental, social and governance (ESG) standards for the property sector.
- data sharing and access need to be carefully balanced with concerns about fraud, privacy and intellectual property.
- Considering the whole system can enable greater transparency, efficiency and productivity.

In addition, HM Land Registry is live to this issue and in 2022 launched its digital strategy.[60] Its role is centred on optimising property transactions, but the ability to do so with clarity and provide lenders with good data is critical for buying and selling but also for funding retrofit.

The only way that this can be achieved is for all parties involved in the designing, building and maintaining of existing homes to work together. The National Retrofit Hub has taken the lead on galvanising views on retrofit standards, data and heuristics and is working towards common understanding across the sector.

Both of these reports indicate the importance that Government places on the unlocking data to spur productivity.

Table 8.16 GC6 Recommendations

	Phase 1
GC 6-1	Sub-region to engage with National Retrofit Hub and ensure that it is inputting to the working groups on data access and management tools and bringing back the lessons and opportunities to align with the Housing Decarbonisation Programme.
GC 6-2	Collaboration across aligned agencies on data sharing, in particular with respect to GDPR.
	Phase 2
GC 6-3	A Retrofit Data Working Party to be set up that would include all key parties that collect, digest, and use data to inform decisions in homes at all stages. The value of tackling this challenge to be clearly spelt out and a programme for discussion and progress mapped out.

GCL 7 - TRAINING AND RESOURCE GROWTH

As indicated in Section 6, an exercise is underway led by the NW NZ Hub to understand the current level of retrofit-focused skilled people in the region. We also note that our consultations with training providers has highlighted the sticky nature of the current feedback loop:

1. Trainers are an extremely scarce resource and once prepared for delivering training have often been tempted by higher salaries in the private sector to carry out installations. This is a critical issue that needs to be resolved.
2. Lack of consistent demand was cited at Warrington Vale Royal College after it had invested heavily in retrofit facilities but then had to decommission then due to because of lack of demand.
3. There were some discussions about putting newly trained personnel into training roles. This would come with a lot of risk given the lack of coal-face experience which needs to be imparted to trainees as soon as possible.

Ultimately, resolving this feedback loop is entwined with creating a steady demand for retrofit in homes.

Supporting trainees on their journey
That demand is present locally in two other sectors; in social housing, where landlords could act as incubators for new and emerging local SMEs wanting experience in domestic retrofit. Local building firms could be supported into this market but they would need to commit to a minimum period of employment for apprentices.

Building Control teams can act as a conduit of expertise. This would need to be explored as we are not aware of this being done anywhere else.

Section 6 also outlined the range of other training and support that could be offered to industry to allow new entrants and existing entrants to access the market.

Hierarchy of expertise
Tabled here as an idea to consider to counter the problem of resource instability, is the notion of career alignment across the sector. The lack of clarity of the route to a steady income has always been a problem when trying to convince people to enter the market as retrofit specialists, especially for more experienced trades professionals nearing retirement.

This might extend to the coordination of salaries across sectors, where a college tutor position could or should be held as a more highly paid position, earned after many years of experience.

Supporting the college business model

With an improved clarity of career for trainers, next comes the need for consistency of demand.

The college network will need to calculate the volume of trainees it will need to cope with across the region

Ideas to ensure consistent resources:

1. Creating a network of part-time tutors from the local supply chain.
2. A regional hierarchy of jobs and career paths with the trainers/tutors at the pinnacle and paid more than installers.
3. Providing cash to support higher salaries at colleges for a time limited period.
4. Cash to support the business case for individual courses as the demand builds i.e. open book accounting to show the break-even point. Cash provided for time limited period covering cost to break even until demand rises.

It is also possible to consider the that for one segment of the training requirement, The Retrofit Academy offers franchise opportunities for colleges and private providers who wish to delivery Retrofit Coordination qualifications. See https://retrofitacademy.org/sectors/education/

Table 8.17 FGC7 Recommendations

	Phase 1
GC 7-1	Carry out or identify a high-level consideration on how to align the demand for qualifications across the new-build and retrofit sectors.
GC 7-2	Production of a Retrofit Training Market Business Plan to home in on the costs that need to be expended over time to underpin higher salaries, the shorter-term losses that might come from a newly launched course until they are self-sustaining and offer benefits to the wider market.
GC 7-3	Seek a method of obligating all local building-related firms to receive an introductory short training course. This could be via Building Control or Planning departments.
GC 7-4	Work with Economic Development officers in all councils to create a proactive (not reactive) service that helps emerging entrepreneurs to enter the retrofit market or existing firms outside of the sub-region to move in.
	Phase 2
GC 7-5	Following on from FL1, a 'supply chain report' offering clarity of the long term aims for the sector to underpin confidence and drive training demand.
GC 7-6	Implement the short introductory training courses for smaller refurbishment suppliers.

GC 8 - CUSTOMER FINANCE

There is no one source of funding that can deliver a holistic scheme on its own. There is no shortage of private finance available, but marrying it with the retrofit market is very hard due to the financiers' lack of confidence in the ability of the scheme to deliver and their awareness of the risk on their part due to a key factor in the UK's regulatory framework: Section 75 of Consumer Credit Act 1974[61] holds that when a customer buys goods or services from a supplier and the item is faulty, not to the right standard or similar, if the customer paid using a credit facility, the lender might be liable for problems with goods and services.

- **Mortgages** – whilst being careful of credit licence restrictions we can target certain customers that are about to carry out renovations and just need to apply for more money on their mortgage.
- Partnering with local providers such as **Credit Unions**.

- Any other finance that the Local Authorities may wish to provide themselves. Local Authorities can borrow from the Public Works Loan board at a lower rate than any other UK organisation and could loan this forward should they wish.

It is essential to be able to offer residents the help to pay for the work required, and this will require a range of finance due to the range of needs. For this project we have identified three categories of resident in order to tune the financial support offer:

1. Fuel poor households – for this group grant funding will need to be maximised and where any gaps existing it may be possible to offer very low interest loans. As will be explained later, an able-to-pay scheme can raise funds through its activity that can be passed onto fuel poor households.
2. 'Just managing' families – a compelling offer is needed for families that are focused on life's essentials in order for them to prioritise energy efficiency over other pressing needs. However, some limited grant funding is available and a very low interest loan could incentive this group.
3. 'Able-to-pay' – finance need not be very low interest but certainly lower than market rates to create an incentive. In addition, it is important to recognise that mortgage finance is amongst the cheapest available, so timing works to align with mortgage provision could also bear fruit.

Overall, the financial model aimed for is set out below and each element will be explained below.

GRANT FUNDING

This report does not deal with grants provided by central government for lower income households as that is outside the scope of this study, although involvement in these programmes should be strategised as part of the development of a sub-regional retrofit programme under recommendation GC1.. However, it is possible that if a scheme centred on the able-to-pay market generates a surplus through its financial success, a grant scheme can be created based around local motives.

Provided there is take-up on the able-to-pay segment of customers (see Appendix 1 for modelled example), there will be surpluses from that side of the programme which can be side-lined to supplement grants and widen the amount of fuel poor properties that can be addressed. This funding could only be generated and distributed using a not-for-profit model such as RetrofitWorks.

From Year 7 of such a scheme it is envisaged that funds will be freed to put into this pot and the calculations are set out in Appendix 1. This therefore places an interesting focus on the able-to-pay sector beyond the need for improving their homes – it is a cash generator for those that need extra support.

In addition, there are currently two grant schemes that align with the domain of a one-stop shop. A one-stop-shop will need to have the credentials required by both mechanisms to access them. These are set out below.

Great British Insulation Scheme: Working with energy suppliers, the UK Government will start the scheme in April 2023, and it will run for three years to March 2026. The Great British Insulation Scheme (formerly ECO+) is designed to be complementary to the current ECO4 scheme, which is an obligation for larger energy suppliers across Great Britain to give their customers grants for insulation to reduce home heating costs. The scheme is aimed at lower income and vulnerable households, including those in houses with poor energy efficiency, with an energy performance certificate (EPC) rating of D or below and those in low (A to D) council tax bands. The reason it aligns with a one-stop-shop is that funding is available for multiple measures per home and a high level of

understanding of the complexity of retrofitting older homes in poorer condition. The OSS will need a close link with at least one energy supplier to access the funding.

Boiler Upgrade Scheme: The scheme provides grants to encourage property owners to replace existing fossil fuel heating with more efficient, low carbon heating systems including air source heat pumps, ground source heat pumps and, in limited circumstances, biomass boilers.

- £7,500 off the cost and installation of an air source heat pump
- £5,000 off the cost and installation of a biomass boiler
- £7,500 off the cost and installation of a ground source heat pump

It is designed to help with the upfront cost. It is accessed through a suitably qualified installation company that will claim the grant back on behalf of the customer. DESNZ are currently consulting on changing the design of the scheme in order to increase uptake.

LOANS

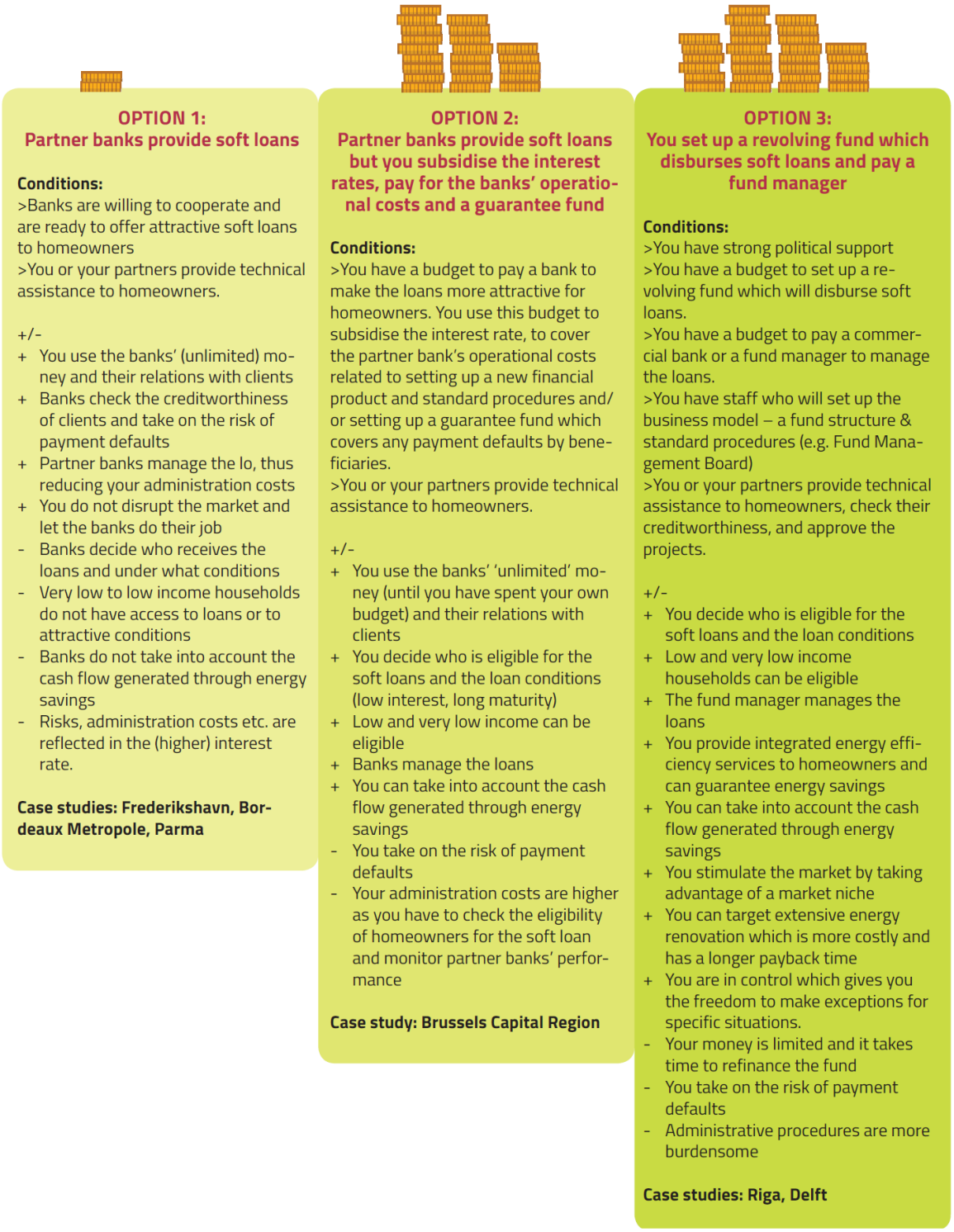
Anyone wishing to seek a loan to finance the renovation of their home has options, but at this time none of them are cheap. When dealing with measures that have the potential to payback of a long period, the added cost of interest payments stretches this payback even further into the future.

On the basis that we are seeking to make an environmental and social impact as a result of the overall domestic scheme launch, we would seek financial partners that would be willing to work with the programme to reduce the interest rate to 2% APR and lower. This has been successfully achieved in other parts of Europe, and in particular it is worth citing Brussels City Region which has reached an agreement with a cooperative bank and a housing co-op to reach levels of 0 to 2% depending on household income, with no favourable interest rate support provided to a households above an agreed income level.[62] It has been able to do this ostensibly by creating a Loan Guarantee Fund which is equivalent to 2.16% of the value of the loan fund at any one time. In fact, since 2008 there has only been one case of default which means that an agreement has been reached to stop topping the fund up.

An overview of the options available can be seen on the next page.

In essence it is possible to approach any accredited or responsible organisation that wishes to input to the loan fund itself. There are many ways to make this work, and one which may be interesting would for local authorities to input themselves with a view to making a return.

Figure 8.5 Soft loan options from across Europe



Section taken from EU Project Infinite Solutions, a review of soft loan schemes applied across Europe

The Role of the Public Sector in Finance

The approach taken by this proposed programme is to make use of any available finance, both for the soft loan scheme to householders and the revenue finance required to make the model work in itself. Both of these are an opportunity for the local authorities to lend and make a return.

However, there is one element that must be taken on by local authorities and cannot be passed on, and this is ownership of the Loan Guarantee fund for a soft loan scheme. However, the modelling

carried out for this report shows that the returns from the overall programme can provide all of contributions to this Guarantee Fund on behalf of the Local Authorities – the local authorities just need to 'own' it.

Direct Loans

Where households decide to self-fund the installation of retrofit measures, there are a limited number of financial products available:

Households can choose to take out Green Mortgages to either purchase an energy efficient house or install retrofit measures The Green Finance Institute (GFI) provide an online overview of the Green Mortgages on offer from UK finance providers.[63]At the time of writing, 60 products were on offer, with eligibility criteria ranging from the property having an EPC band of B or above or the installation of a range of listed measures such as heat pumps and loft insulation. They could also choose to take on standard unsecured home improvement loans to fund the work.

Citizens Advice conducted research into household views on retrofit and their appetite to borrow to fund the work[64]. This found that a little over 1 in 10 households interested in retrofit would be willing to borrow money to fund the work.

The GFI have investigated the demand for Property Linked finance[65], which would provide loans for 100% of cost of energy efficiency which is tied to the property rather than the property owner. This provides a long term, low risk loan and an approach which has been successful in the USA, delivering c$10 billion of investment. The GFI have also published an overview of other finance options, such as Community Municipal Bonds and Energy Saving ISAs.[66]

One provider of retrofit finance is Lendology, who provide low interest property linked loans to households. Their standard model involves sourcing money from a local authority, borrowed from the public loans board to lend to households within the region. These loans are guaranteed through the application of a Title Restriction on the property deed.

The **Scottish Government** has since 2015 offered householders a combination of a grant and zero interest loan for energy efficiency (not glazing and loft insulation) and renewables systems (link). The loans are available in tranches:

- under £5,000: 5 years
- £5,000 - £9,999: 10 years
- more than £10,000: 12 years.

The grants offer a total available grant funding for energy efficiency improvements is up to 75% of the combined cost of the improvements, up to the maximum grant amount of £7,500 or £9,000 for households which qualify for a rural uplift.

In 2020-21 Home Energy Scotland Loans supported 1,221 households to install more than 1,247 renewable measures. The number of heat pumps for which funding was committed through the Home Energy Scotland Loan scheme increased by almost a third, from 586 systems in 2019-20 to 762 systems in 2020-21. The Private Rented Sector Landlord Loan supported a different demographic, providing funding for 54 measures in 44 properties over the 2020-21 financial year.

In 2020 Cheshire East commissioned a 'Carbon Finances Study Synthesis Report from a consortium of providers led by Accelar, funded by the NW Net Zero Hub. The sought to determine the appetite, viability and practicalities of introducing council tax and/or business rates-based incentives as one of the measures to stimulate the energy efficiency market. It concluded that:

1. A hybrid approach to financial support would make provision for the "unable-to-pay" as well as "able-to-pay" households. For example, a smaller-scale grant or discount scheme could be operated for eligible households alongside a loan scheme. This would involve council tax rebates and 10-year loans, paid for by a rise in council tax for all households. This would be largely cash neutral.
2. Government would need to simplify the process of securing loans via second claims (liens) on properties. An alternative would be to underwrite the Council's credit default risk (at least for an initial period of time) under loan scheme options, without itself taking a second charge on properties.
3. A pilot or demonstrator phase, accompanied by an appropriate participant feedback and robust evaluation process, is advocated as the best way to build on the evidence.
4. That any new scheme in Cheshire East is predicated on the requirements of existing QA regimes, namely PAS2030:2019, PAS2035:2019 and the Microgeneration Certification Scheme (MCS) as applicable.

In addition, by working alongside and/or with existing providers, Cheshire East Council has the opportunity to maximise carbon saving in the target sectors through collaborative working and complementing existing. It was also recommended that any new initiative considers bringing together at least some of the current sources of assistance into a single basket to streamline the offering to the customer, which mirrors other recommendation in this report.

Table 8.18 GCL8 Recommendations

	Phase 1
GC8-1	Identify an appropriate local mechanism for advising householders of all kinds on the mix of loans and grants that would suit them. This could be alongside FL5-2
GC 8-2	Engage with the Green Finance Institute to make sure that the sub-region is fully abreast of all possible customer finance options as they emerge.
GC 8-3	Understand all local authority's appetite for a revolving loan fund
	Phase 2
GC 8-4	As a One-Stop-Model emerges, ensure that the most appropriate finance of the customers to be targeted is available and the customer journey enables access to it.

GC 9 - QUALITY ASSURANCE FRAMEWORK

A Quality Assurance Framework in construction is a systematic set of policies, procedures, and processes established to ensure that the construction project meets predefined quality standards and requirements. The primary goal of a Quality Assurance Framework is to systematically manage and improve the quality of construction processes, materials, and final deliverables. It involves the implementation of measures to prevent defects, identify issues early in the construction process, and ensure that the project adheres to specified quality criteria.

If large numbers of householders are to be convinced to raise (on average) circa £22,000 to retrofit their home, they will need to be convinced that the work will be of good quality based on strong processes and oversight from advice, to design to installation.

At this time, when a householder qualifies for an energy efficiency grant, they will be funnelled into the PAS2035 quality assurance standard framework as a core requirement for the programme. This also applies to the Social housing Decarbonisation Fund (SHDF) work. Outside of this there is a reliance on building professionals and tradespeople understanding their minimum requirements in the UK Building Regulations in terms of design and reporting. Relying on the Building Control officers

to enforce the UK Building Regulations when most of the home improvement work that we are hoping to see in the future is outside of their remit and could be installed by DIYers.

While building control serves as a mechanism to establish minimum standards for construction, it has faced criticism on several fronts. Critics argue that relying solely on building control as a minimum standard may have limitations and drawbacks. Some common criticisms include:

Compliance vs. Performance: Building control often focuses on prescriptive requirements, specifying certain materials and construction methods. This can prioritise compliance over actual performance, potentially leading to sub-optimal building efficiency and resilience.

Minimum Standards: Building control sets minimum standards that builders must meet, but these standards may not necessarily reflect the best practices or the most sustainable and energy-efficient solutions. A focus on minimum standards may hinder innovation and the adoption of more advanced technologies.

Limited Enforcement: Enforcement of building control standards can vary, and in some cases, resources may be insufficient to adequately monitor and ensure compliance. This can lead to instances where buildings do not meet the specified standards, posing risks to occupants and the public.

Focus on Structural Safety: Building control traditionally emphasizes structural safety rather than broader considerations such as energy efficiency, sustainability, or accessibility. This narrow focus on structural safety alone may not address the evolving needs and priorities of modern construction.

Post-Construction Issues: Building control typically involves inspections during and after construction. This focus on the construction phase may not adequately address post-construction issues, such as building maintenance, which is crucial for the long-term durability and safety of structures.

Varied Standards: Building control standards can vary between local authorities. This lack of uniformity may create challenges for construction professionals working across different jurisdictions and could result in inconsistencies in the quality of construction.

To address some of this, there have been discussions about shifting towards performance-based building codes that focus on outcomes and results rather than specific methods or materials, but that will be a long time coming. However, putting in place a regime by which local programmes to encourage householders to take part in domestic retrofit upgrades will need something more than the above.

Something like the PAS2035 standard would be appropriate for the non-grant works but does not exist in the UK.

PAS2035

PAS 2035 is a British standard that provides a framework for the energy retrofit of domestic buildings. It was developed to improve the energy efficiency of existing homes in the UK. The standard was created to address issues related to the inconsistent quality of retrofit work and ensure that energy improvements are carried out effectively and sustainably.

The need for a standardised approach to domestic retrofitting emerged as part of the UK government's efforts to address energy efficiency and reduce carbon emissions from existing building following the ‘Each Home Counts Review’ which took place after the ending of the Green Deal. The aim was to establish a systematic and consistent methodology for retrofitting projects.

The standard was developed by the British Standards Institution (BSI) in collaboration with various stakeholders, including industry experts, government agencies, and environmental organizations. It underwent a thorough drafting and consultation process to ensure that it captured the diverse perspectives and expertise in the field. PAS 2035 was officially published in 2019. It replaced the previous PAS 2030 standard and introduced a more holistic and risk-based approach to retrofitting. The standard focuses on addressing the specific needs of individual buildings and occupants, and the role of the Retrofit Coordinator as the custodian of the quality process.

The key principles are:

1. Whole-House Approach: PAS 2035 emphasizes a holistic, whole-house approach to retrofitting, considering the building as a system rather than individual components.
2. Risk-based Methodology: The standard introduces a risk-based methodology, assessing and mitigating risks associated with retrofit measures to ensure the long-term success of the improvements.
3. Quality Assurance: PAS 2035 establishes measures for quality assurance throughout the retrofit process, including the design, installation, and evaluation stages.

The standard defines specific roles and responsibilities for various professionals involved in the retrofit process, including retrofit coordinators, designers, and installers.

- **Retrofit Assessor** – the role of the Retrofit Assessor is to carry out an energy assessment of the dwelling (which includes collecting information on the structure, existing heating system and controls and efficiency measures already installed) as well as a condition survey and an occupancy assessment. The Retrofit Assessor supplies this information to the Retrofit Coordinator.
- **Retrofit Coordinator** – the role of the Retrofit Coordinator is draw up the improvement plan (which will span a period of 25 years) based on the information provided by the Retrofit Assessor (although some Retrofit Coordinators will carry out the assessment of the dwelling themselves) and ensure that all elements of the retrofit are properly managed and coordinated. More information about this key role can be found here.

- **Retrofit Designer** – it is the job of the Retrofit Designer to design a bespoke package of energy efficiency measures, particularly insulation and any measures that might potentially interact.
- **Retrofit Installer –** the role of the Retrofit Installer is to install the energy efficiency measures recommended in accordance with PAS2030:2019, which covers the install, commissioning, and handover part of retrofit projects. To deliver work under PAS 2030:2019 installers must demonstrate their competency and be certified by a TrustMark scheme provider.

After the publication of PAS 2035, there was a transition period during which stakeholders in the retrofit industry adapted to the new standard. Training and certification programs were developed to ensure that professionals were equipped with the necessary knowledge and skills, and the industry is about to encounter the transition to a new version that will ensure.

A framework for non-grant work

For a systematic 'engine' of advice, design, tendering, installation and oversight to be available to all householders, one needs to be created. The PAS2035 standard offers a sample of what this could be, but work needs to go into establishing something more appropriate. This is a national, not just a sub-regional problem, and until this is resolved it will be hard, but not impossible, to launch a retrofit programme for all households. Schemes such as Cosy Homes Oxfordshire and People Powered Retrofit offer the professionals ta all stages to mirror the PAS2035 principles, for a fee, but these are not 'normal' to the average householder and will need to be come normal if we are to see traction.

Table 8.19 GC9 Recommendations

	Phase 1
GC 9-1	Engage with National Retrofit Hub, TrustMark and others to understand to optimal quality assurance framework to satisfy the aims of the housing Decarbonisation Programme of the sub-region
	Phase 2
GC 9-2	Implement and monitor an open and transparent QA framework and communicate it benefits and performance to householders and supply chain.

Table 8.20 Summary of Feedback Loop Mitigation activities

		Feedback Loop content	Lead in	Who leads and who supports
GC 1	**Strategic Retrofit Programme absence**	• No technical view of what retrofit is required to reach zero carbon performance • There is no holistic view of the multiple benefits and how one programme could solve all. • All resources are used up chasing inappropriate funding pots that don't suit needs. • Procurement processes unable to be creative due to lack of vision	**6 months to 1 year** to full agreement.	**TAKES RESPONSIBILITY:** C&W LEP **WHY:** Local Auth level is too narrow, avoids capture by local politics, market requires wider understanding **PAID FOR BY:** TBC **SUPPORT FROM:** All local stakeholders need to input. DNOs are critical here.
GC 2	**Working Capital**	• No suitable funding available to provide working capital for delivery models that pull all components together. • Challenge to attract partners to discuss meaningful change	**6 months** - business case **+** **6 months** - raising capital	**TAKES RESPONSIBILITY:** C&W LEP **WHY:** Local Auth level is too narrow market requires wider understanding and follows from NFL1 **PAID FOR BY:** TBC **SUPPORT FROM:** NFL1 stakeholders
GC 3	**Generating demand**	***General awareness of retrofit*** • Good news stories compete with stories of bad installs • Misinformation spread by well-funded proponents of non-eco measures • Conflicting messages of retrofit approaches ---------- ***Scheme marketing*** • The approach is not 'normal' and needs to rise above standard marketing • If offer is too narrow it defects its own purpose - needs to cover all areas to build customer trust. • Other linked services that are off-message stop take-up (e.g. Building Control and Planning teams being unaware will sow doubt)	**3 months** to design and launch an awareness raising campaign. **12 months** to gain traction ---------- **3 months** after gaining funding for a scheme	**TAKES RESPONSIBILITY:** Local Authorities **WHY:** Best routes for messaging are known **PAID FOR BY:** TBC **SUPPORT FROM:** All stakeholders that recognise the need for better performing homes for whatever reason. ---------- **TAKES RESPONSIBILITY:** Scheme commissioner **WHY:** Part of the service **PAID FOR BY:** Working capital raised **SUPPORT FROM:** Formal local partnership underpinning the scheme

		Feedback Loop content	Lead in	Who leads and who supports
GC 4	**Carrots and Sticks**	• No 'structural' incentives act e.g. reduction in council tax or stamp duty, no tangible rise in house price (yet) • Energy saving or carbon saving benefits are not 100% guaranteed (yet) • No regulatory requirement to act • No push or pull to take the next step.	**3 month** scoping exercise	**TAKES RESPONSIBILITY:** Local Authority **WHY:** Some statutory powers – possibly available via devolution if an option. **PAID FOR BY:** TBC **SUPPORT FROM:** Central Government
GC 5	**Funnel of Death (non-social housing only)**	Linked to NFL 4 and 5: • Advice stage has funding for short periods only, installations rely referrals and hope • Very inconsistent % conversion at each stage of processes undermining business cases. • When advice funding stops, the end-to-end is not self-sustaining. • Schemes are high risk to launch without whole-journey funding.	**6 months** to recruit, launch and reach full operational capacity of a 'one-stop-shop' + Run for at least 3 years to establish	**TAKES RESPONSIBILITY:** Formal local partnership **WHY:** Piece-meal and without collaboration, will fail. **PAID FOR BY:** Working capital raised **SUPPORT FROM:** LEP, NW NZ Hub

GC 6	**Data Strategy**	• Data is collected and used in many different formats at a variety of stages of the journey
		• Coordinated action across the complex market is hard
		• Lack of framework makes post-completion data collection expensive and mis-aligned – so it doesn't happen.
		  • Expensive to start
		  • Very hard to track progress and review
			Several years to fully resolve – significant collaborative effort required.
			Work can continue/commence without this, but lessons learned and reporting
				TAKES RESPONSIBILITY: National Retrofit Hub
				WHY: A national-level problem requiring buy-in from a v wide range of stakeholders.
				PAID FOR BY: Participants in the process / C Government
				SUPPORT FROM: Local Authorities

GC 7	**Training and Resource Growth**	• Customers discover insufficient number of trades to meet volume even now, in advance of future large volumes. • Existing refurb trades resist retrofit to revert to their comfort zone. • Existing refurb trades also blame lack of demand as excuse for not retraining.	**6 months** to align training need with resource planning and an underpinning support plan (if required) (TBC) **6 months** to create training (TBC)	**TAKES RESPONSIBILITY:** C&W LEP **WHY:** Training providers are mix of public and private, their catchment is regional **PAID FOR BY:** TBC **SUPPORT FROM:** Local businesses, Local Authorities

		Feedback Loop content	Lead in	Who leads and who supports
GC 8	**Customer Finance**	• Customers seek financial support to bridge their affordability gap. • Finance providers do not believe there is sufficient demand to launch new products. • Finance providers do not understand retrofit risks so those 'green products' that are emerging are not attractive.	**6 months** to review appetite for locally-led finance product and build partnerships with providers	**TAKES RESPONSIBILITY**: One lead Local Authority **WHY:** Internal exploration, share with others **PAID FOR BY:** TBC **SUPPORT FROM:** All LAs, LEP, NW NZ Hub
GC 9	**Quality Assurance Framework**	• No clear framework that covers all types of retrofit work, all types of customer • Customers face a lack of clarity on protections which differ across measures and project funding. • Contractors resistant to follow additional rules, 'paperwork' and what they see as hassle.	For Social housing and Grant Funded Schemes, framework is clear but far from perfect. **Long term project** to evolve those and 'Willing-to-Pay' market model	**TAKES RESPONSIBILITY:** NW NZ Hub **WHY:** Covers all tenures, customers, trades **PAID FOR BY:** TBC **SUPPORT FROM:** Local businesses, Local Authorities, National Retrofit Hub

We have taken the view, albeit with limited consultation with local stakeholders, that the lead-into a fully functioning retrofit market for the region would look like this:

9. Working towards a holistic decarbonisation programme

So far in this report we have addressed the 'what' that needs doing, broadly the 'how much', and the 'who'. The holy grail for such a complex web of stakeholders, customer needs and property types would be a programme date for every measure in every home until everything is completed, that every home accepts their prescription and timetable, and that technology does not improve or become superseded over that period. But that will never happen.

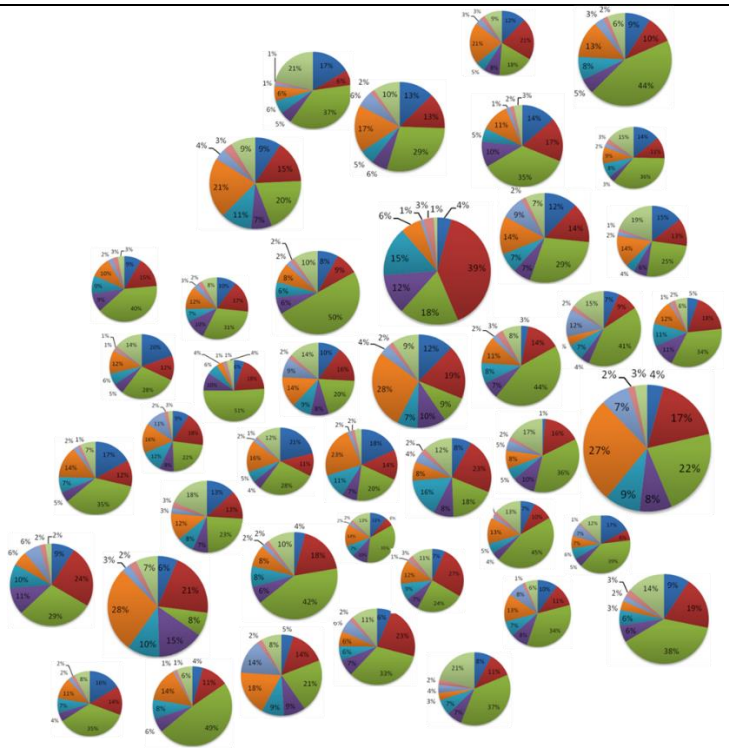
Figure 9.1 Overview of 40 home energy baseline assessments in one square mile

Key:

- Windows/Doors
- Heating inefficiency
- Roof
- Floor
- Lights
- Hot Water
- Walls
- Appliances
- Draughts

Each house has a unique energy use profile and a unique energy and carbon return on investment. Each house also has unique:

- *Budget*
- *Motivation*
- *Occupant lifestyle*
- *Occupant timeline*
- *Heat loss*
- *Etc.*



40 home energy baseline assessments for homes in one square mile, all the same age (+/- 5 years circa 1900), same architype
© Parity Projects

We have identified some of the things holding the market back, and how to reduce those. This section of the report identifies some of the possible routes to reaching the end goal that has been identified in the Pathways reports, and segments them into identifiable portions around which a delivery mechanism could be placed, and then:

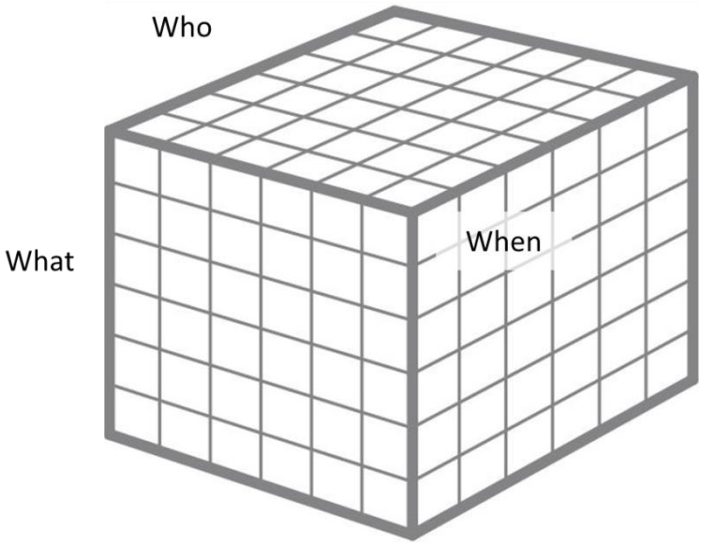
- Remove some homes from retrofit challenge e.g. by identifying cost effective heat network opportunities
- Identify homes which offer multiple benefits and ought to be tackled as priority e.g.
    - Those in areas of electricity grid stress and offer cost savings to the DNOs and the taxpayers
    - Homes of the fuel poor and the vulnerable
    - Homes that attract Government grants at any particular moment
    - Homes by which the owner is ready to make a change but just need a nudge to do so.

SEGMENTING HOMES

Homes will sit within several segments, and this will help to define priorities and offer design.

When considering domestic retrofit programmes, the key is to design solutions that are genuinely attractive to homeowners and the supply chain that we need to coax into life. This is likely to mean a number of sub-scheme offers that complement one another, probably launched at different times, if they don't exist already. Moreover, it is important to recognise that different customer types may have trigger points as to when an offer is more likely to be taken. The following diagram summarises this subtlety:

Figure 9.2 Generic depiction of the many ways in which a scheme could be designed to focus on a customer need



- **What** The works that could be carried out.
- **Who** House type, House tenure.
- **When** e.g. Distressed purchase, change of life circumstance, moving into the home, whole house refurb etc.

On this basis there is a very large range of focused offers that could be made, and a programme plan would be based on an assessment of sensible starting positions based available data, judgement by local professionals and of course the available funds to take action. We can seek to understand localities from a strategic perspective and understand how a conflation of issues can be solve with a particular tactical approach offered out to the households. Such segmentation could be based on:

1. Access to waste heat from heat networks.
2. An understanding of the grid capacity and whether it will cope with full electrification of homes and road vehicles.
3. The possibility of dominant building architypes and an opportunity for simplified offers, at scale to all, in a group buying approach.
4. A particularly dominant community group that is able to gather customers together to respond to a particular approach.

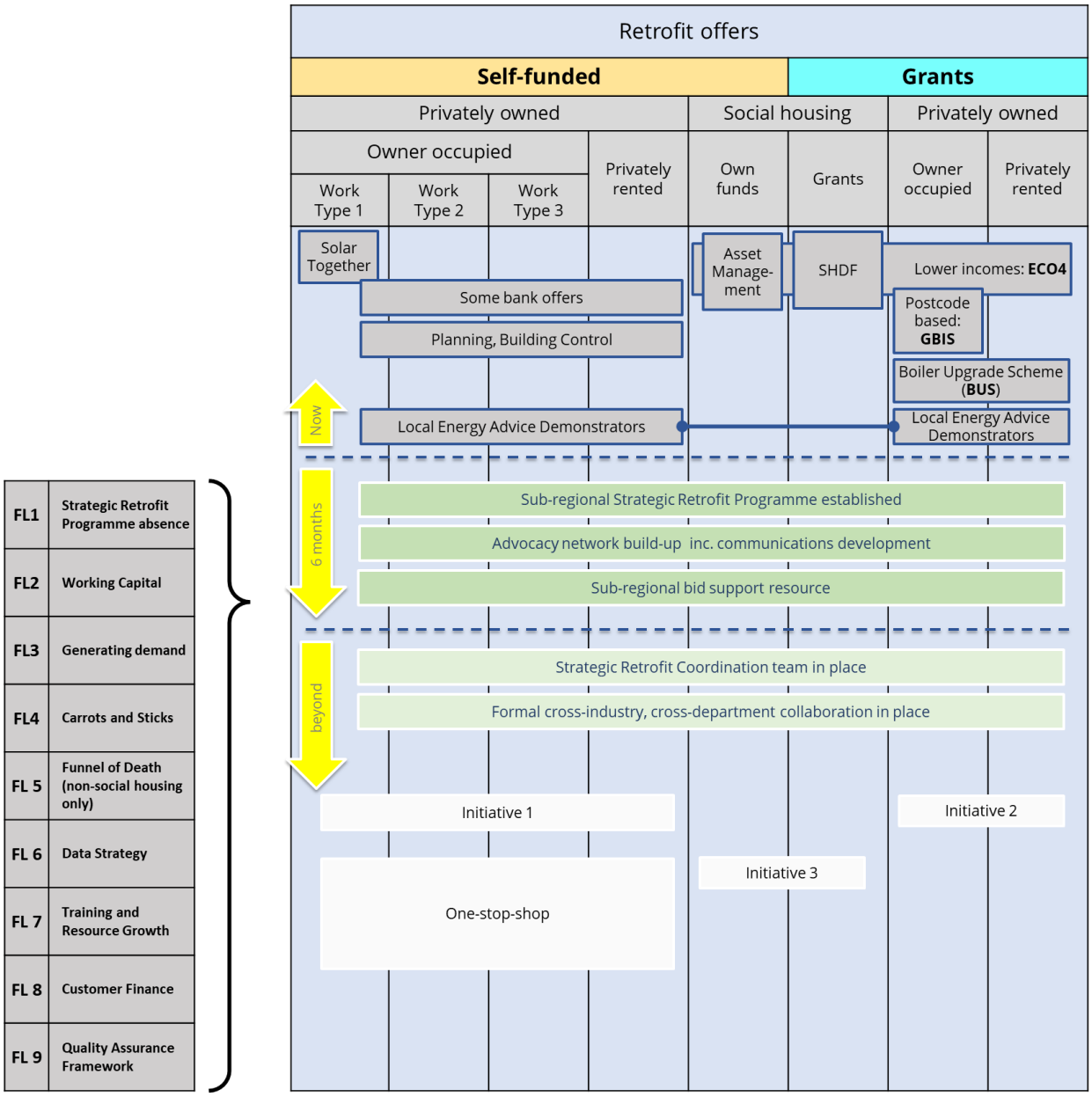
Each segment of households will:

A. Think about their homes in a certain way; how they live in it, use it and plan to make changes to it.

B. Have a variety of motivations for making a change:
   i. Health
   ii. Carbon
   iii. Saving money
   iv. Home improvement/investment
C. React to certain types of marketing in their own way.
D. Have a preference for the type of contractor and customer journey they would like to follow.
E. React in their own way to incentives and regulatory nudges.

This section sets out the stages leading up to the completion of this report. Some of the FL attenuation could allow existing services to widen and improve, but in other instances something new is needed. The interplay is set out below.

Figure 9.3 Overview of Retrofit Offers



REVIEW OF PROGRESS TO DATE IN THE SUB-REGION

This section is a commentary on progress made to date is some of the key segments in the sub-region. The

following sections consider progress to date against household segments that may overlap with each other, but they allow us to take a view on traction and opportunities.

Social Housing

Progress under asset management:

Through the Clean Growth Strategy, the UK government has set a target for social housing providers to attain the minimum rating of Energy Performance Certificate (EPC) C for rented properties by 2035 (2030 for 'fuel poor' households). Most landlords have taken a blanket approach, aiming for 2030 and as a result the social housing stock is the best performing tenure in the country.

Decent Homes standard

Social Housing is currently regulated through the Decent Homes Standard (DHS). This sets out the legal minimum standards a property rented out by a social landlord is required to meet. The Government is currently reviewing this standard to make it more stringent[67]. This includes a proposal to expand the standard to the Private Rented sector. From a practical perspective, the DHS outs an expiry date on certain assets and gives the landlords options for compliance. Given this date-driven regulatory push, landlords must optimise their programmes whilst working fast and efficiently to maintain the standard, and this activity, if executed alongside retrofit works, offers opportunities for smart delivery.

Parity Projects worked with Halton Housing in 2023 to evaluate the potential for optimisation of the long-term programme for home maintenance and retrofit such that a 'plan for every home'. We brought together the planned works, decent homes standard compliance works, and the preferred retrofit scenarios modelled in the Portfolio tool, to place an execution date against every required measures in every owned home for the next 50 years, based on an optimised least-cost route for refurb execution. This exercise demonstrated an overall budget saving of £22.5m or £3000 per property, simply for having a long-term plan for tier 7500 properties.

Social landlords have the luxury of having a good amount of control over access to the properties and when work should be carried out, but if they do not have the resource to identify these savings and then modify plans accordingly, the savings are not realised and money will continue to be wasted.

NB – social landlords do not always have unfettered access to all of their own homes even when doing the right thing, so a strong communication and awareness campaign would suit this tenure too.

Social Housing Decarbonisation Fund (SHDF):

Based on the most recent statistics available at the time of writing, 276 properties in Cheshire East and Cheshire West and Chester had received retrofit measures through the SHDF[68] since its launch in March 2022. Social Landlords with housing stock in the area have received £59.1m although no bids as of yet have been led from the sub-region. These are strong mechanism, but progress can only be made under them if there each landlord has the means to pursue them. In our discussion with Weaver Vale, it was clear that the aims are to improve, but they have had a nine-month resource gap to focus on retrofit. Muir had not participated owing to the low number of qualifying housing stock within their portfolio.

Our engagement with social landlords as part of this study and our wider work has found that owing to the complexities of smaller social landlords are reliant on others to include them in bids. This includes providers of shared ownership 'affordable housing' who are not currently eligible to receive the funding.

A 'Process Evaluation'[69] issued in June 2023 on the Whole House Retrofit (WHR) and Social Housing Decarbonisation Fund Demonstrator (SHDF(D)) by DESNZ covering the programmes' activity from January

2021 until June 2022. It is not an Outcome report which is yet to come. The report suffers from significant research limitations as not all of the evaluation projects are finished, unsuccessful applications were not interviewed, tenants' views are very limited.

It would be fair to say that this sub-region has not benefitted as much as other nearby regions from the significant funding available for social landlords.

Privately Rented Homes

The Minimum Energy Efficiency Standard (MEES) was explained in the section on FL4, and the ongoing uncertainty about when the next level of compliance will be introduced has stalled all progress in this sector.

Hastings Borough Council worked with Parity Projects, in combination with its mandatory Landlord Accreditation Scheme, to maintain a database of PRS addresses in the borough. Even properties that had never had an EPC were told the likely score and given advice on what to do any by what deadline, relative to the MEES. This is a powerful mechanism as the regulation requires the standard to be reach even in the absence of an EPC, and a process of retrofit can be triggered on the back of it.

Landlord Accreditation Scheme

There is Landlord Accreditation Scheme model that has operated across the sub-region managed by Cheshire West and Chester. The scheme is currently suspended in Cheshire East but aims to promote good standards of accommodation in the private rented sector which meets legal requirements and good management standards. It aimed to provided public recognition for landlords showing that they have properties that meet or exceed the accreditation standard thus providing a good choice of quality accommodation for tenants.

Cheshire West hold events, the latest attracted over 50 landlords at the Civic Hall, Ellesmere Port on 23 November 2023. The event covered a wide range of topics including local energy efficiency support. Warrington also hold a PRS forum twice per annum. This mechanism provides a strong conduit for conveying policy intent, gathering intelligence, consultations and possible transition support

Warrington Council also has a Landlord Forum which provides an opportunity to spread awareness of the landlord's legal obligations and good practice and for the council to engage with landlords on any related matters including policy changes. The Landlord Forum started in January 2002 and meets twice a year at the Gateway, Sankey Street, the next being in March 2024. A landlord newsletter is also published twice a year and is circulated to landlords.

This communication mechanism is a useful tool for engagement but at this time we are unaware of meeting attendances.

Owner Occupiers

Willing-to-pay customers

'Willing-to-pay' customers in this sense are those that, if convinced to take action, would be willing to invest in their own property whether that is through cash reserves or borrowing. It is extremely difficult to find data to identify the speed of domestic retrofit outside of any programme overseen by either social landlords or grant programmes primarily as so much work is tackled by industry with no involvement from Building Control officers or Planning officers and will be carried out by DIYers.

According to the Office of National Statistics, around 2.5% of all homes are heavily renovated every year. Some of that work will reduce energy consumption and CO_2 emissions, but this will generally be driven by minimum Building Regulation standards where they have been enforced. Given that so much more is possible that the Building Regulations do not drive, all of this other work will be missed opportunities.

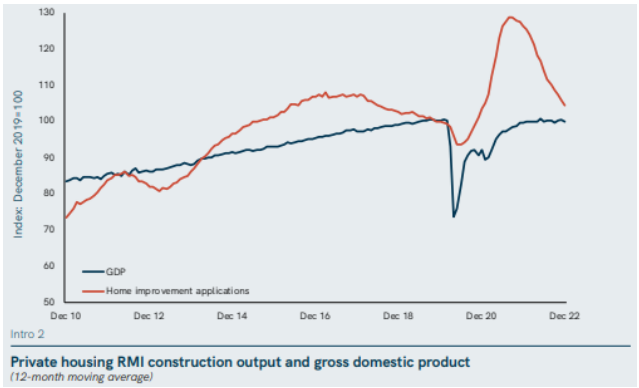
The UK spends ~£30bn per year on repair, maintenance & improvement of housing, so even a small uplift on this is a huge market in real terms. Additionality is being considered in the following terms:

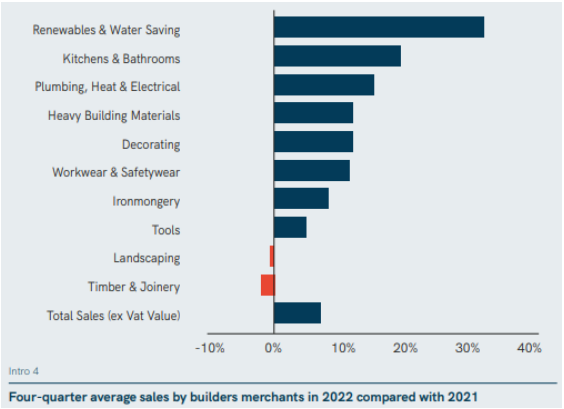
- Where existing works are being carried out through renovation, failures or upgrades, and that work is pushed to a higher specification or a wider scope.
- Where certain markets are poorly performing and new customers are to be accessed.

In Section 9 we covered how the installation of insulation measures does always involve Building Control sign off, and the need for a quality Assurance Framework. The presence of such a framework could possibly justified at very least to provide progress data to inform policy decisions.

The North West saw the biggest jump in home improvement planning applications between 2019 and 2021 of any region or devolved nation of Britain. The Barbour ABI Home Improvement Report for 2023 provides some insight into regional progress in this sector.

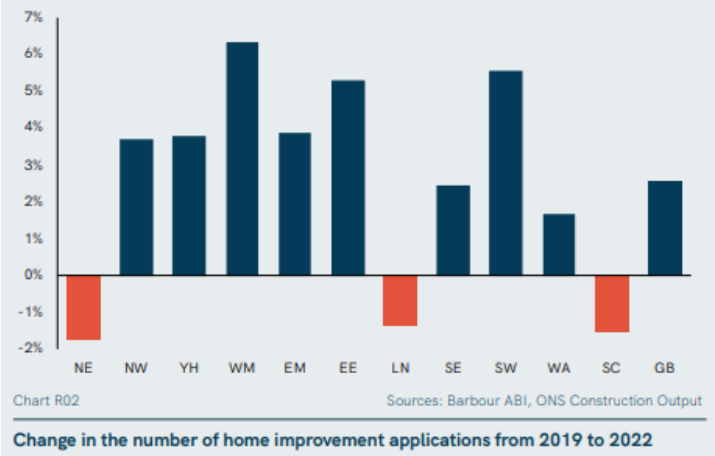
Figure 9.4 Private housing output in comparison to GDP





In addition to the above, a Legal & General survey suggested buyers will pay up to 20% premium for low carbon homes [70], so overall the momentum is building for energy efficiency work in homes. This is held in the NW too as per the regional stats below.

Figure 9.5 Overview of Change in number of home improvement applications from 2019-2022



Change in the number of home improvement applications from 2019 to 2022

Providing a service to willing-to-pay customers should have a strong foothold in the sub-region, and the opportunity and process is set out in Appendix 1 of this report.

Energy Efficiency Grant Schemes

A proportion of owner-occupied homes will be able to access grants for retrofit measures through Government funded retrofit schemes. These are cross tenure and predominantly target households experiencing or at risk of experiencing the Government's definition of fuel poverty

These are relatively limited, budgets only covering the more basic measures, with LAD and HUG projects able to spend more per property with a target of upgrading the lowest standard of housing to at least a rating of EPC C.

For the majority of households who do not qualify for these funding streams, the best way to monitor uptake is through building an understanding that a proportion of homes are retrofitted every year by virtue of home improvement and compliance with Building Regulations.

Below is a breakdown of the number of measures/ properties receiving funds through the Government Energy efficiency schemes outlined above in the sub-region. Whilst some of these funds are cross tenure, they provide one of the only routes for owner occupied properties to receive support for retrofit measures.

Table 9.1 Overview of Grant Funding received in the sub-region

Scheme	Cheshire East	Cheshire West & Chester	Warrington	Total
ECO -*Number of energy efficiency measures installed between Jan 2013-September 2023* [4]	15,988	15,582	10,513	42,083
HUG1 – number of houses upgraded (measures to be installed by Mar 2023)	36	>5	0	~41
LAD Phase 1 – number of houses upgraded (measures to be installed by Sep 21)	206	32	29	267
LAD Phase 2 – number of houses upgraded (measures to be installed by Sep 22)	139	195	201	535

[4] All UK homes receiving at least one benefit are eligible for support under the ECO scheme.

RHI – *Number of accredited installs between April 2014- March 2023*	797	529	97	1,423

In addition to this:

- Cheshire East and Cheshire West and Chester have a collaborative bid of £6.2m to the second iteration of the HUG scheme which is expected to finish delivery of retrofit to off-gas properties in March 2025.
- The Cheshire and Warrington LEP area received £2.2m from the first wave of the SHDF, with the social landlords in the area contributing an additional £1m through match funding.

Both Cheshire East and Cheshire West and Chester council both have published Eligibility Statements for residents to access the tranche of ECO4 funding allocated to the Local Authority Flexibility of ECO4. At the time of drafting, Warrington Council did not participate in this scheme. This part of the scheme is only available for owner occupied properties.

The Great British Insulation Scheme (GBIS), formerly known as ECO+ was launched in March 2023. In addition to the providing single energy efficiency measures for households who qualify for ECO4 it also provides funding for properties in council tax bands A-D. The published stats for the scheme are currently too high level to include a regional breakdown within this report, with their only having been circa 1k installs since the schemes launch.

The RHI was replaced by the Boiler Upgrade Scheme. Again, at the time of writing there was not statistics available at a local authority level. The latest stats we have for the scheme have showed that the North-West region as a whole had seen 1,223 vouchers issued and paid[71], predominantly for heat pumps.

Care and Repair and Disabled Facilities Grants
Currently there are targeted schemes within the sub-region for improving the quality of housing for residents.

- Cheshire East's Care and Repair is a service for older, disabled and vulnerable people and guides them through or can carry out repairs and adaptations in their own home. There is a framework for contractors
- Under the Live Well scheme, grants are available of up to £50,000 for work to make homes more accessible for people with disabilities. Homeowners, tenants and people living with others are eligible to apply.

This is a model that already exists that could be used to do more.

Technology Specific Initiatives

All three authorities have also recently participated in a collective purchase scheme for solar panels for their residents through the Solar Together Scheme run by iChoosr. This scheme provided residents with access to discounted solar panels and storage batteries through a collective auction process. The scheme saw strong interest from residents, both in the numbers registering for the progress and those that chose to progress the process to installing the measures. We do not have performance data for these schemes at time of drafting.

Table 9.2 Initiatives

	Phase 1
OO-1	Put in place dedicated resource to support local organisations and public sector departments in accessing central government grants when available.

Empty Properties

It was estimated that there were 1,455,010 dwellings in England and Wales that were truly vacant on Census Day 2021 (1,352,130 in England and 102,875 in Wales), using census and administrative data sources. This means there were no usual residents living in these dwellings and there was no indication of these being used by short-term residents or visitors.

Table 9.3 Percentage of all dwellings that are second homes (with no usual residents) and vacant dwellings, local authorities, England and Wales, 21 March 2021

Source: Census 2021 from the Office for National Statistics, Local Authorities, ElectraLink, NHS Digital, Driver and Vehicle Licensing Agency and the Department for Education

Area Code	Area Name	Second homes (with no usual residents)	Vacant dwellings
	England and Wales Average	**0.71**	**5.50**
E06000007	Warrington	0.2	3.75
E06000049	Cheshire East	0.29	4.64
E06000050	Cheshire West and Chester	0.28	4.18

Table 9.4 Number of vacant dwellings by accommodation type, national to local authority districts, England and Wales, 2021

Source: Census 2021 from the Office for National Statistics, Local Authorities, ElectraLink, NHS Digital, Driver and Vehicle Licensing Agency and the Department for Education

Area Name	Detached whole house or bungalow	Semi-detached whole house or bungalow	Terraced (including end-terrace) whole house or bungalow	Flat, maisonette or apartment	A caravan or other mobile or temporary structure	TOTAL
Eng & Wales	222,280	242,895	304,465	639,865	45,470	1,454,975
England	198,185	223,695	277,350	612,300	40,565	1,352,095
North-West	22,190	36,900	55,785	72,700	3,370	190,945
Cheshire East	2,170	1,780	1,785	2,605	190	8,530
Cheshire West & Chester	1,570	1,260	1,570	2,155	225	6,780
Warrington	550	1,040	915	1,000	35	3,540

Cheshire West and Chester has an Empty Homes Strategy for between 2022 – 2027.[72] This sets out the plan to return up to 1,000 empty home over the lifetime of the strategy to unlock the potential of long term empty properties. To do this, Cheshire West and Chester have devised a financial assistance programme involving loans and grants combined with advice and support. In certain circumstances, enforcement action is also applied.

Cheshire East as an interest-free Empty Property Loan worth up to £20,000 which could be used to supplement any initiative that would seek to use empty homes as example homes for local residents to visit. A lot of evidence has been gathered that shows the experience of seeing and learning from those that have retrofitted encourages others to engage and make progress.

Table 9.5 Initiatives

	Phase 1

EP-1	Explore the possibility of using the Empty Property mechanism as part of the regional retrofit programme and a network of sample homes for visitors.

Area-based programmes

The benefits of the Kirklees Warm homes project were set out earlier in the report. The efficiencies of operation and heightened awareness amongst residents make the approach very attractive. Whilst 'street-by-street' is often cited as an means to tackle the retrofit challenge,

Since 2013 the Scottish Government has invested £373m in the creation of a series of Area Based Schemes for energy efficiency. Designed and delivered by local councils working in conjunction with the ECO-obligated energy companies. Rather than relying on a scatter-gun approach, these schemes frequently target whole wards in deprived areas. Delivering large numbers of improvements to mixed tenure, multi-occupancy properties in particular. Such projects deliberately prioritise help for "harder to treat" properties requiring solid wall or complex cavity wall insulation.

CIVIC SQUARE is demonstrating neighbourhood-scale civic infrastructure for social and ecological transition, together with many people and partners in Ladywood, Birmingham UK. They are creating a community of interest around a specific area of Birmingham here: https://www.facebook.com/RetrofitBalsallHeath/

Principally, they are working to share practically and openly how the climate transition and retrofit of our homes and streets can be designed, owned and governed by the people who live there now in systemic, tangible and participatory ways.

Table 9.6 Recommendations

	Phase 1
AB-1	Consider as part of the sub-regional retrofit programme work the crossover with regeneration programmes, aligning with advocate groups to tackle place-based approaches and the benefits that would ensue.

Regeneration and New Homes

Each local authority has regeneration programmes in train which to some extent include either new housing or the retrofit of older stock. The Warrington Central 6 Regeneration Masterplan[73] was created by Kevin Murray Associates for Warrington Borough Council to regenerate the central six wards to catch up with the growth and development the wider Warrington area is experiencing. One of the Delivery Themes is creating Inclusive Neighbourhoods and Housing meaning Retrofit has a key role to play in delivering the masterplan. As part of this Torus are currently in the process of obtaining planning permission to renovate Kingsway House in Latchford, including improving the levels of insulation for residents of the nine-storey block of flats.

Cheshire East Council have proposed regeneration projects in both Crewe and Macclesfield. In Macclesfield[74], one of the key outputs is to improve the housing choice to sustain a more diverse community of occupiers in the town centre.

Cheshire and West have set out regeneration plans for Chester, Ellesmere Port, Northwich, Winsford and the rural areas.[75]

All three local authorities have received funding from various central government funds. Going forward, they should consider how they can utilise future funding opportunities to retrofit properties within their chosen regeneration zones to further improve the quality of life of the residents in these areas.

Other benefits that will support new homes

The roll out of heat networks can also unlock areas of the sub-region for new housing where development

is being blocked by constraints on the energy networks. Currently, a lack of grid capacity acts as a barrier to development of sites until the network can be reinforced to meet the peak load demand of the housing on the site. Through connecting these new properties to an existing heat network, new housing can be built without requiring significantly increases in capacity on the electricity network to support heat pumps/ electric heating driven by the proposed Future Homes Standard.
A coordinated area based approach to retrofitting existing properties in the same area as the proposed new build development as outlined above, this can potentially free up capacity on the existing network.

As outlined in section 7, the requirement to build new housing to this new standard will also drive the uptake of retrofit skills in the supply chain, as it provides an opportunity to deploy the heat pump, solar and insulation installation skills developed as part of the retrofit transition. It also provides industry with the confidence to invest in retrofit training ahead of need if there is a clear indication that the skills for retrofit required will also enable them to access new build opportunities.

Table 9.7 Initiatives

	Phase 1
RGN-1	The Economic Growth teams within the three local authorities and regional LEP should work together to engage the construction industry in the region to highlight the changes set out in the future homes standard, working with colleges in the region to ensure their construction courses future proof learners and provide opportunities for upskilling of the existing work force. For more details on our proposed actions for the colleges please see Section 6. Skills and jobs required.
RGN-2	If any of the three local authorities choose to replicate Warrington's approach of developing redundant council land for housing through an inhouse delivery mechanism, these properties should be of a net zero standard to demonstrate to industry there is an appetite for such properties within the region.
RNG-3	Within the sub-regional retrofit programme work, set out clearly how new-build housing growth will benefit from the establishment of improvement local infrastructure power by the retrofit market.

PRIORITISATION OF HOUSEHOLDS WITHIN SCHEMES

Whilst considering the possible delivery mechanisms for mobilising the resource to achieve retrofit at scale, it is important to understand how to focus the roll out of the schemes to where they will be needed most at a particular moment in time.

Healthy Homes

Any formal vehicle for sub-regional retrofit programme must include representatives of health services so that systems can be created to deliver improvements to their roles and also to ensure that there is access to data to inform programmes. Retrofit delivery should focus on those homes in most need, either because the occupants have existing health conditions affected by the quality of their home, or through identifying homes that may cause health problems if they are not improved.

Table 9.8 Initiatives

HE-1	Ensure that health professionals are represented in all development workshops and in the governance of future programmes.
HE-2	Establish a cost to the sub-region of unhealthy homes either to the NHS or Local Authority as part of the sub-regional retrofit programme development.

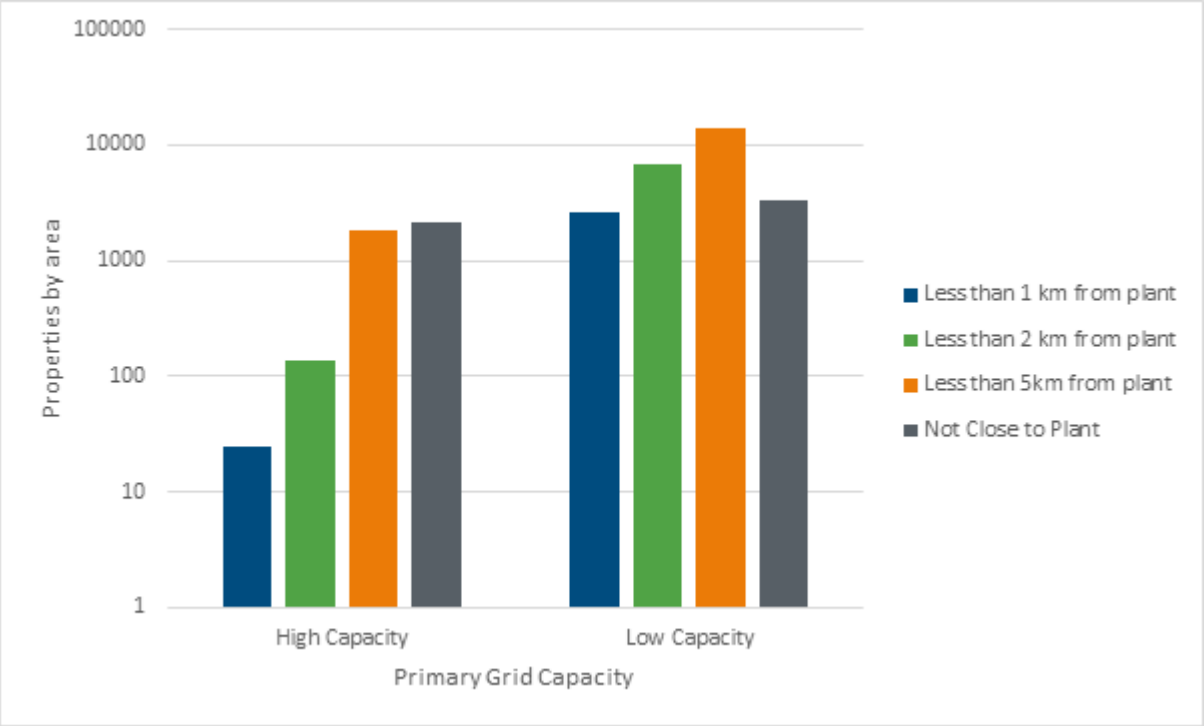
Heat Network Opportunities

The previous sections have demonstrated that there are strong opportunities in the sub-region through the implementation of heat networks.

Focusing on the properties in the areas of highest heat demand density and looking at which of these properties are serviced by areas of the grid with lower capacity, and their proximity to potential waste heat sources, we can begin to look at the difference in cost between rigorous fabric retrofit and the developing of large scale heat networks across Cheshire and Warrington.

Below are shown the number of properties which are situated in pockets of high heat demand density and how this relates to their relative proximity to plants or waste heat sources and whether or not they are in areas with stretched grid capacity.

Figure 9.6 Number of properties in areas of high heat demand density and proximity to potential heat source



The properties in high grid capacity areas are of less concern, the grid in these locations will more likely be able to accommodate the additional electricity consumption associated with widescale installation of heat pumps.

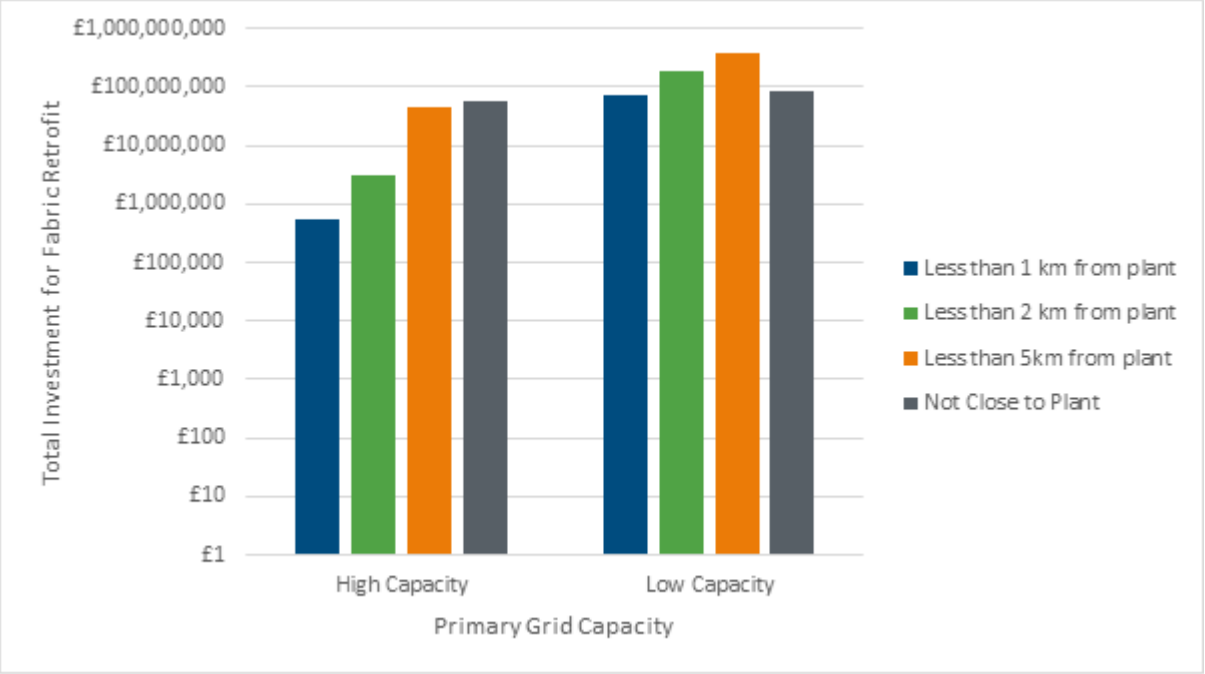
In the low capacity areas there is a large number of properties that are with close proximity to a potential source of waste heat for a heat network. The viability of larger distance heat networks is highly dependent on the source of waste heat and the surrounding environment.

Table 9.9 Number of properties close to heat source

	Less than 1 km from plant	Less than 2 km from plant	Less than 5 km from plant	Not Close to Plant
High Capacity	25	136	1813	2151
Low Capacity	2628	6909	14105	3351

These properties the most important to look at heat network development as an alternative to heat pumps as a route to decarbonisation are those near a plant (<5km) and in areas with low grid capacity, we think the number of these top priority properties is approximately 23,600 properties.

Figure 9.7 Cost of potential deep fabric requirement close/ far from identified heat network source



Above outlines the cost for a scheme of deep fabric retrofit to the corresponding properties. Looking at the total cost of retrofit to the roughly 23,600 highest priority properties, we calculate that a scheme would cost for just these properties a total of £629m. For the further ~3,400 properties not near a potential heat network source the value is £84m, giving a total cost of £713m.

This fabric retrofit work would allow for smaller heat pumps to be installed in these properties, helping alleviate the stress on the grid associated with decarbonisation of domestic properties.

Table 9.10 Initiatives

HN-1	Ensure that heat network professionals are represented in all development workshops.
HN-2	Commission a detailed analysis of district heat network costs for those areas identified by the analysis in this report.

Electricity Grid reinforcement

Each Distribution Network Operator (DNO) in the region has a long-term programme for upgrading their energy network over the next decade. As set out in previous sections, there are significant opportunities to collaborate with DNOs to assist the reinforcement of the grid by allowing systematic replacement of gas heating with heat pumps and de-stressing the grid can also come from widening heat networks mentioned

above.

Table 9.11 Initiatives

	Phase 1
DNO-1	Ensure that the DNOs are represented in all development workshops and in the governance of future programmes.
DNO -2	Commit resource within the development of the sub-regional retrofit programme to engaging in detail with the DNOs to identify the cost savings to the tax payer in aligning domestic retrofit programmes with grid reinforcement.
DNO -3	Establish a formal partnership to share data on progress to underpin revisions to retrofit programme design.

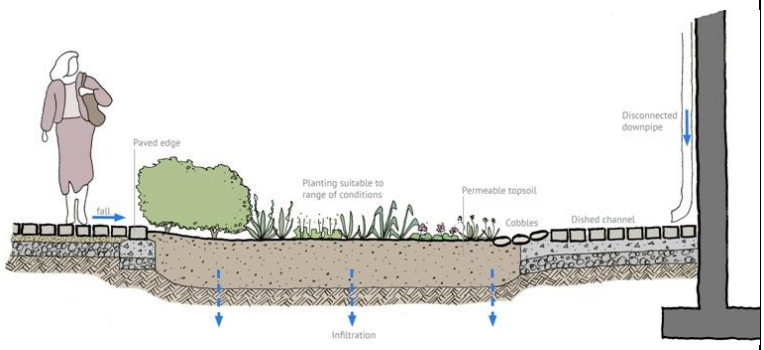
A link to water utilities

The biggest problem with a combined system is that every time it rains heavily the system is vulnerable to what are known as combined sewage overflows. The rain essentially overwhelms the sewage system and its pipes, and spills through an outlet into a river or the sea.

There are several approaches that can assist with this:

1. Sustainable Urban Drainage systems (SUDs) can allow rain to filter directly into the substrate without passing to the drainage systems.
2. Green roofs – will slow down the passage of rain and to some extent be absorbed.
3. Rainwater harvesting – rain is stored until capacity is reached for re-use by the home.

Figure 9.8 Overview of SUDS and Green Roofs



Designing outdoor areas for SUDS Credit: Susdrain

A Green Roof Credit: Wallbarn

Consideration of the benefits of such works if carried out alongside domestic retrofit will reduce the pressure on the utility system and provide cost saving to utility providers.

Table 9.12 Initiatives

	Phase 1
DNO-1	Ensure that the DNOs are represented in all development workshops and in the governance of future programmes.
DNO -2	Commit resource within the development of the sub-regional retrofit programme to engaging in detail with the DNOs to identify the cost savings to the tax payer in aligning domestic retrofit programmes with grid reinforcement.
DNO -3	Establish a formal partnership to share data on progress to underpin revisions to retrofit programme design.

ADDRESSING TECHNICAL CHOICE CHALLENGES

Earlier in the report we addressed the tension between some of the technology choices that can be made such as with heat pumps and the need for insulation, between fuel poverty and decarbonisation. A small library of typical local archetypes and appropriate architype-specific guidance for the sub-region can provide a steer for professionals working across the industry and manage the expectations of householders (with appropriate caveats) if accessed online. This will greatly assist training of retrofit coordinators too.

Table 9.13 Initiatives

	Phase 1
ARC-1	Commit resource within the development of the sub-regional retrofit programme to create architypes for advice, training and customer guidance.

SCHEME DESIGN AND METHODOLOGY TO CALCULATE BENEFITS

Each scheme offer should be regarded as a tactic, all of which fulfil an overall strategy. The proposed strategy is to target the end result and work back to the present day i.e. to squarely focus on the need to transform the performance of each and every building in each participating local authority area, whilst recognising that the offer to the resident must be carefully designed to suit their ability to pay, that the benefits are tangible and that they are supported through the hassle of the process.

That strategy is tabled here as the following:

A. That a minimum standard is set for all homes to reach at key milestones up to 2050.

B. That this standard is related to the annual emissions of CO_2 from the building. In this way it can be a blanket standard under which other standards such as UK Building Regulations, Energy Performance Certificate scores and the Passive House Standard reside.

C. That this standard corresponds to a set of appropriate measures that are designed to suit the house and held in an online database. That the set of measures is visible to as many agencies acting on behalf of the householder or homeowner as possible so that energy efficiency opportunities are always considered in every decision.

D. That any designed energy efficiency scheme targets certain trigger points (of least resistance) in the life of the building, but focuses on the overall designed set of measures that have been set out in C.

E. That any other services in the local area have access to overall designed set of measures that have been set out in C to maximise opportunity.

This approach catches all homes at some point and on that basis has the ability to be inclusive of all services that may already be run by each local authority, charity etc. On that basis, seeking to plug any gaps in services offered by such organisations can bring a level of focus to the drive towards energy efficiency.

'ONE-STOP-SHOPS' AS A POSSIBLE SOLUTION

Understanding the best path to take for one home is complex; there are a large number of technical options and whether they suit the building, whether they fit with each other, how the implementation fits with the householders' ambition, putting a plan together such that it is understandable and can be quoted by a contractor that is capable of doing the work. So, if one home is tough, we then need to consider the extremely intimidating timescales for national transformation.

Most participants in the 'retrofit, maintenance and improvement' (RMI) sector of the construction industry know very little about the reasons for carrying out domestic retrofit, how to carry it out, and hence never sell the proposition to householders, or in the worst case, actively discourage for fear of exposing lack of understanding.

A 'one-stop-shop' (OSS) is at the most basic level is a place where a homeowner can come for every element required to get the retrofit done; advice, surveys, plans, designs, quotations and installation. The OSS will be the first point of contact, but team members within will make arrangements with other experts for each stage of the process that suits customers' needs. The concept has been around in Europe for around a decade but it is still not widespread. Some UK examples are set out in the next section of this report. They vary in their content and the responsibility they take for the work itself, but all one-stop-shops are essentially designed to offer a smooth customer journey to ensure they more customers engaged and taking action and a better outcome in the end.

It should also be recognised that even a successful one-stop-shop will never be a panacea for the transformation of the entire housing stock. A proportion of householders will always wish to go directly to a contractor or architect for instance and not need support.

DEVELOPING THE DELIVERY PROGRAMME

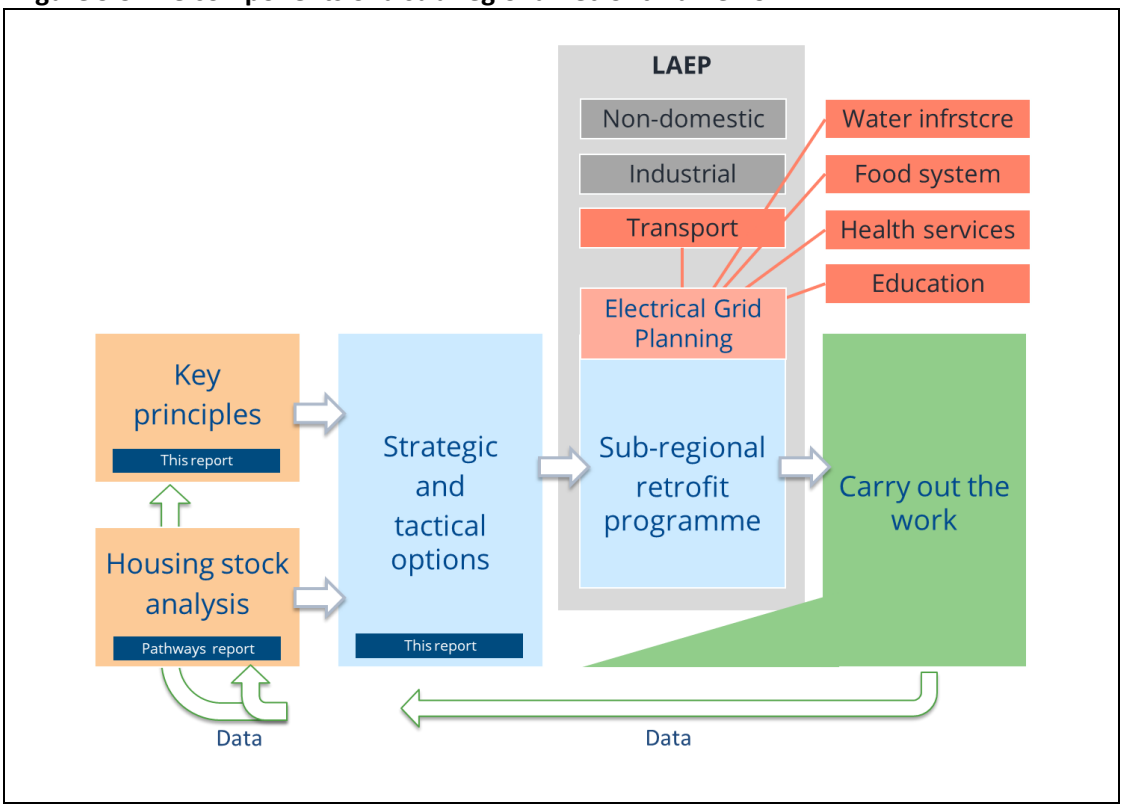
We are proposing one framework onto which any number of offers to householders are created based on the prioritisation that the range of stakeholders in the region will need to agree upon. The opposite of this is what has been attempted to date; piecemeal and time-limited attempts at based on bids into generic funding streams that may not fit a local need.

The following diagram sets out some key stages of the journey that would achieve this overall framework for housing decarbonisation:

1. **Housing stock analysis**: to understand the current performance of the homes and what measures need to be installed to reach zero carbon performance.
    a. The Parity Projects Pathways platform is available to council officers under licence to interrogate the stock and to support policy decisions.
    b. Underlying data will continually update and buildings improve over time. The platform can show progress and assist in reviewing policy decisions periodically.
2. **Key principles**: many options have been set out in this report but crystallising them into a 'key principles' document would ensure the overall sub-regional programme is based on agreed parameters. It would also assist with external communication with stakeholders.
3. **Strategic and tactical options:** this report has set out many of the options available to the sub-region to draw upon in a programme, together with an estimate of the overall range of benefits available on which to support investment decisions.
4. **Sub-regional retrofit programme:** please see Section 12 for details. This is an appraisal of the tactical initiatives required to enable the decarbonisation of all homes, and a prioritised programme of activities based on a comparison of the needs and benefits of tackling each of the housing segments.

5. **Local Area Energy Plan (LAEP)**: item 4 above is a substantial part of a LAEP particularly as it needs to be created alongside the local DNOs.
6. **Carrying out the work**: rolling out the initiatives on a foundation of careful planning is only part of the task – recording progress and impact and feeding back completion data to the inform the ongoing maturity of the framework is as critical to ongoing success.

Figure 9.9 The components of a sub-regional retrofit framework



10. The business case for change

The case for action will be squarely based on the sub-regions ability to identify financial savings that can be shared to pay back any initial capital investment required. There are a range of intangible benefits from domestic retrofit too, but they can't be used to accelerate change.

Based on the key analyses carried out in this report, the following table sets out the underpinning value in creating a mechanism to realise benefit to a wide range of stakeholders in the sub-region:

Table 10.1 Aggregated potential savings across all stakeholders as a result of decarbonised homes

		Initiative	Benefit	Est. for the region	
1	Accessing greater share of UK grants locally	Coordinating resource	Better conditions – health savings	£1 on fuel poverty = 42p to NHS = £135m to NHS [A]	
2	Delivery savings:				
A	Targeted, longer term delivery programmes for improve take up…..	Targeted initiatives Better consumer finance	Reduced bills to residents Better conditions – health savings	5% of bill reduction = ££761m [B]	
B	….and reduced delivery cost	Collaborative models	Reduced capital cost	10% = £926m	
C	Optimised programmes and savings available (e.g. Halton Housing £3000/home)	Strategic retrofit coordination	Reduced capital cost	10% of £1.3bn = £130m	
3	Electricity grid reinforcement savings	Strategic retrofit coordination	Share of £2,385 to £7,154/home	10% = £132m	**£97.45m per annum to 2045**
4	Heat Networks	To reduce reliance on retrofit, align waste heat sources	Speed of decarb deployment Reduced bills to residents Cost saving to industry	TBC	
5	Reducing the risk of retrofit errors	Quality framework	Reduce cost of works to homeowners / enhanced reputation of sector	TBC	
6	Job creation – circa 3,000 [C] posts	Success in mobilising the retrofit programme	Greater local earnings – increased tax revenue	TBC	

			Reduced reliance on state to support		

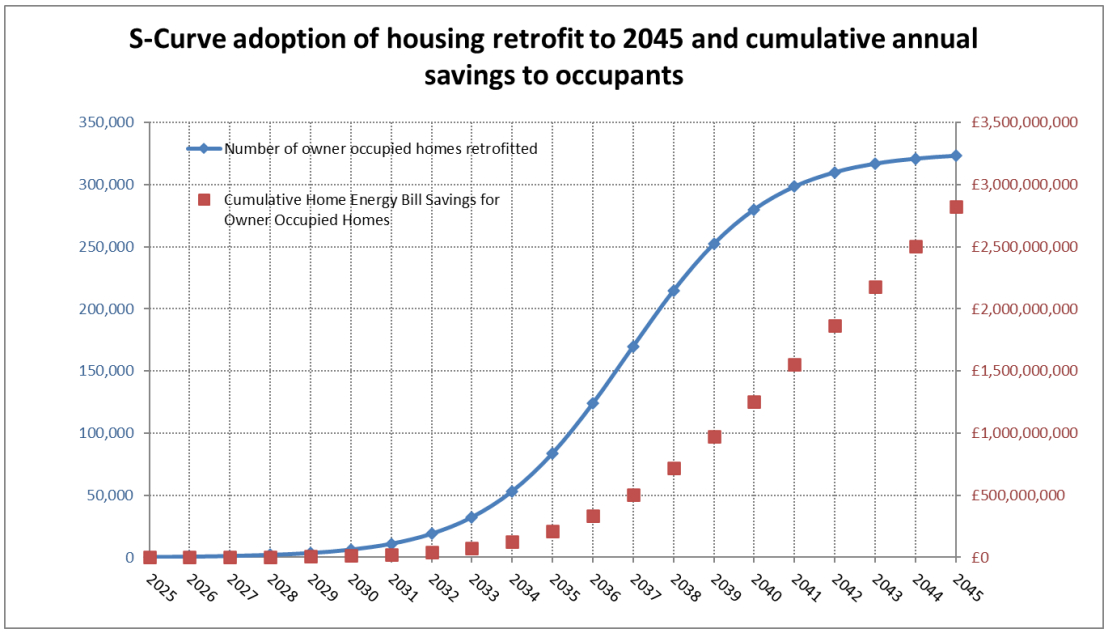
[A] **NHS savings have not been brought into the total as they are unlikely to be shared with a delivery mechanism.**

[B] **These savings would be accessed by a delivery mechanism through risk sharing models such as 'heat as a service' See Fig 10.2 below for the graphic of the calculation**

[C] **This is an estimated net figure as we do not yet have statistics on the existing numbers or skilled trades in the region.**

Based on item 1 above, any resource created to provide great access to funding for local resident would not have a direct saving, but an umbrella mechanism that sought to optimise across all areas would do so. However, the overall picture is that, based on only a small share of the potential savings, there is a potential return of £1.2bn to power the mechanisms to create those savings. Should 2045 be targeted as a date for substantial completion of this project, and there was a commercial agreement for all stakeholders to centralise this proportion of savings, this would create £97.56m per annum return for funding the resources necessary to make the change, which would need to include interest payments on loans if required.

Figure 10.2 Accumulated annual household energy bill savings - £15.2bn over 20 years



Other opportunities for savings are set out below and more work could be done to identify the savings available to power a sub-regional retrofit programme:

Table 10.3 Potential wider benefits of retrofit

	Relationship to retrofit
Economy	Local authorities measure local GDP(GVA) as a benefit arising from a growing market. Moreover, as the unemployed move into paid work, there will be a reduced cost on the authorities.
Health	Aside from those elements mentioned previously, specific health improvements as a result of better internal air quality in homes can be reached with good home retrofit. The addition of ventilation measures as standard under PAS2035 quality framework could be replicated in all homes.
Educational attainment	Students that have a poor home environment to work in tend to achieve poorer results. The sub-region would benefit in this area from the retrofit drive.
Resilience to climate change	In a hotter climate, homes are more likely to overheat. With rainfall more intense for shorter periods, our drainage systems will need to cope better. Both of these issues can be tackled systematically with trained professionals backed up by communication exercise.
Reduced pressure on water utilities	In times of flood, the sewers could overrun. Utilities can benefit from joined-up programmes.
Waste reduction	Construction notoriously returns around 30% of all of its newly manufactured materials back to waste due to poor planning and poor productivity. Other savings to local authorities are available here if consideration is made to this issue in a retrofit programme.
Comfort improvement	People are prepared to pay more for better homes but in spite of various reports suggesting house price rises, there is no firm evidence of consistent impacts.

The development of a Sub-regional Retrofit Programme should explore these benefits in a formal collaboration with partners to add more wight to the decarbonisation push.

11. Sub-regional Retrofit Programme

The creation of sub-regional Retrofit Programme would entail a number of activities, all aim to provide certainty on how each segment of homes will be tackled, both technically and logistically, and how that segment has been prioritised around others. It would include an appraisal of the tactical initiatives required to enable the decarbonisation of all homes, and a prioritised programme of activities based on a comparison of the needs and benefits of tackling each of the housing segments. Given collaboration is at the heart of this, formal arrangements will need to be established so that all stakeholders that gain co-benefits from retrofit are part of the governance.

Start-up – 6 months – estimated cost of £350,000.

- Strategic Retrofit Coordination team set-up.
- Consultations with all stakeholders on future roles, access to data to assist prioritisation, appetite for collaboration, ability to drive retrofit. The budget cost includes covering the cost of stakeholders presence in workshops.
- Detailed review of DNO grid capacity - reinforcement programme savings achieved if alongside retrofit.
- Detailed review of district heat network options for the sub-region and interfaces with retrofit.
- Architype review and guidance: for designers, contractors and councils staff on steps to de-carbonisation

- Core programme development

Ongoing delivery - per annum - £350,000 per annum

- Strategic retrofit coordination team
- Ongoing core programme development

Following the establishment of the tactical comparison above, each would be mobilised and run at the recommended time. The additional costs that will need to be kick start each tactic would be:

a) Business case
b) Marketing plan
c) Staffing
d) Data strategy
e) Project Management, budget control and reporting to centre

All set out on the basis that this falls within the scope of the return on investment as set out in Section 10.

Tactics could be:

- Place-based fuel poverty scheme centred on the most vulnerable area first (Crewe and Nantwich), picking up willing-to-pay customer in the locality
- Solar Together revisited
- Heat Pump version of Solar Together
- One-Stop-Shop for willing-to-pay customers (see appendix 1)
- Private Rented Sector support programme.
- Home Retrofit Exhibition network based on bringing empty homes back into use for a period before selling on the market.

The value of these individual tactics would not be understood without the central programme having been established based on data that would delve into the achievable co-benefits.

Other immediate actions

Other nearby regions, through combined authorities, have assisted social landlords and local authorities by providing resource to put bids into central funding pots for HUG2 and SHDF schemes. This resource, if set alongside the Strategic Retrofit Coordination team, would bring in more funding to drive the sub-region forward at the same time as providing clarity on the strategic direction required with regard to decarbonisation, health improvement, grid reinforcement etc.

12. Role of public sector

To put the building blocks in place to roll out the sub-regional Retrofit Programme proposed above, a collaborative model which includes all the public sector organisations identified within this report as benefitting from the rollout of Retrofit should be discussed. This model is likely to take the form of regular meetings, workshops formulised within a frequently updated collaboration agreement.

Where the private sector has a role, for example the three DNOs in the region, this collaborative model should factor in how and when to engage them to realise joint objectives whilst ensuring any competing priorities are best managed. It will also enable each party to identify areas of their organisational priorities which retrofit can help deliver, ensuring all the possible benefits are delivered.

The first activity of this collaboration would be to set out and agree exactly which parts of the programme each partner is responsible for or should feed into the development of the detailed proposals and outline this with a collaboration agreement which is signed by every party. Whilst some of these roles will be statutory responsibilities (both current and those proposed in the future such as Heat network zoning), thought needs to be given on where the non- statutory activities best sit. Within this report we have identified where we best think these should sit but it is important to ensure each public sector partner is fully bought into the proposal and understands what is expected of them and their short, medium and long deadlines. We propose these discussions are structured around the nine grouped challenge sets identified in the report and the recommendation we have set out to mitigate the feedback loop. Where staff resource is required, the group should ensure internal funding is available to support the activity/ ensure this is not a barrier to the programme being delivered. Through approaching the challenge in this joined up and collaborative manner, it is likely each organisation will find it a more cost-efficient way of delivering retrofit when compared to simply operating within organisational silos.

To drive the change required to kick start retrofit in the sub region a key decision the collaboration needs to make is whether it will be either a:

1. Central convening organisation to tackle all non-social housing, but a remit to steer technically, or
2. Focus on steering technically but providing resource to all stakeholders that need to be driven.

The group should look to progress the development of Local Area Energy Plans (LAEP) to identify the most efficient way of managing the challenges of decarbonising housing in the sub-region at the same time as Electric Vehicles are rolled out. This should be a priority as one stakeholder mentioned during our engagement 'we need to prepare for local area action planning – not necessarily needing another report.' The LAEP will also enable the collaboration to best identify the areas it can have the most impact on in the short, medium and long terms and where best to propose collaborations with DNOs/ other external parties.

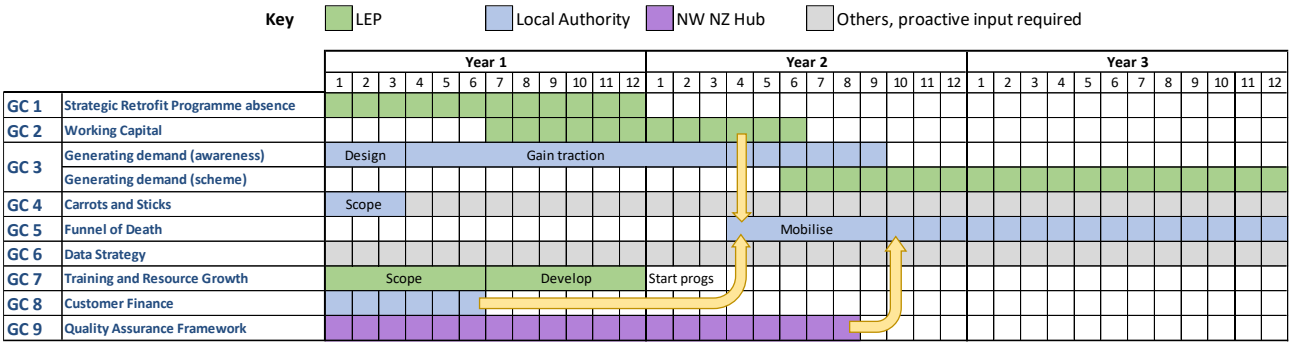
The group should start work immediately on maximising the amount of government retrofit funding being delivered in the region through collaborative bids for funding, delivering efficiencies through scale and utilising public sector partners, such as the NHS to find eligible households who would benefit from retrofit. This could also include providing staff resource to social housing providers in the region to coordinate bids to the Social Housing Decarbonisation fund when they do not have capacity to lead a bid within the organisation.

This collaboration should also be utilised as an approach of sharing best practice/ experience gained through projects completed by each local authority/ public body outside of the collaboration. This should include:

- Approaches to applying for/ best utilizing of central government retrofit funding.
- Promoting retrofit to residents.
- Procurement approaches for suppliers of retrofit measures.
- How best to utilize Retrofit within Economic Growth activities.
- How to obtain organizational buy in for retrofit.
- Past research into the skills required to deliver retrofit in the area.
- Experiences of investing in renewable energy projects for example, Warrington Council's investment in Solar Farms.[76]

Where there are uncertainties in how best to deliver aspects of the Sub-Regional Retrofit plan, such as how best to provide residents with access to financial products to fund retrofit and whether a regional one stop shop is required to kick start the market, this collaboration should look to commission to ensure all parties benefit from the research and to avoid spending public money on duplicated studies. Once these studies are completed, the Sub-Regional Retrofit Programme should be updated to reflect the findings, with again the collaboration agreeing on the roles each member will play in the new/ amended activities.

As the collaboration delivers the Sub-Regional Retrofit Plan, it should proactively engage with the supply chain to communicate the opportunities retrofit presents and ensure it is aware of the pipeline of projects on the horizon. Through doing this, the collaboration can provide industry with the confidence it needs to invest in training of new/ existing staff and scale up to the levels required to decarbonise housing across the sub-region. Through building up and maintaining this communication channel, the group can also ensure all proposals promote economic growth across the region.



13. Conclusion

This report has set out the background to the complex challenge of decarbonising the housing stock of the sub-region. Looked at from a national scale perspective, the £540bn capital cost alone is the biggest engineering project the UK will have ever taken on. To attack this challenge at the necessary pace and accuracy requires systems change, not a list of short-term, disjointed projects.

As demonstrated, collaboration across a variety of sectors that converge on homes is necessary to reach the co-benefits that will pay for the up-front investment. Whilst the Sub-Regional Retrofit Plan might be labelled as a decarbonisation programme, the wide range of benefits such as driving economic growth and delivering improved health outcomes to residents means that it could be called something entirely different.

The feedback loops holding back the various mechanism across the sector must be mitigated to enable the delivery tactics, so this this challenge will tell a story of system change and potentially culture change.

With a carefully curated, clear plan with support from local leaders, we believe that cash could be accessed from central government to pay for the development for the collaborative Sub-regional Retrofit Programme from innovation sources within DESNZ or due to the potential significant benefit of a more resilient, decarbonised electricity grid from OFGEM.

From a leadership perspective, the approach that must be taken is ‘go big or go home’. There is no middle ground. In fact, half attempts are very likely to muddy the motivation of the construction sector to get involved when the big push eventually comes. Based on our understanding of work being carried out elsewhere across the UK, Cheshire and Warrington are in a perfect position to plan effectively and push hard as they are holding largely a blank sheet of paper; others have initiatives and frameworks in place that will need to be unpicked to take the correct tack.

14. Appendices

Appendix 1 – Considerations on developing stand-alone retrofit delivery models (One Stop Shops)

Domestic retrofit measures must be attractive to homeowners and be part of an overarching comprehensive offer. The following are key components of a comprehensive scheme:

Table A1 Considerations of developing a one stop shop

• Pressure for change	There needs to be adequate push from regulation and pull from advocates and peers, the market etc.
• Leadership and Vision	A simple and achievable vision set out for all householders, with clear commitment by all stakeholders involved to lead by example and work towards a common vision. This must be aligned with householder aspirations such as comfort, health, affordability and desirability.
• Capable people with time	The overall mechanisms need to give competent people time and space to do their work well. This applies to key decision makers as well as the tradespeople doing the work on homes. This will mean a radical improvement in knowledge of all personnel that interact with houses in all stakeholder organisations.
• Actionable first steps	The offer to householders has to be simple, supported and practical. People walk away from complex processes very quickly. Also, it means that we shouldn't let 'perfect be the enemy of the good' to get started.
• Effective reward and recognition	A structured and endorsed means of demonstrating compliance is a good start, but that compliance should come with visible recognition and potentially financial reward such as tax (or pseudo tax) rebates for instance. This approach will also underpin any aspirational attainment achieved by the retrofits and thus create some community competitiveness.

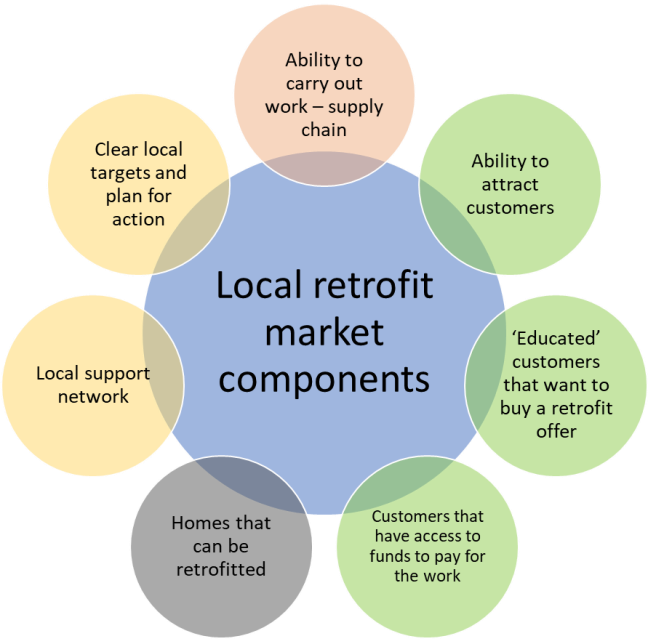
In summary, a successful domestic retrofit project must ensure that all these parts are rigorously addressed from day one or it will not deliver.

The C&W domestic retrofit market

This section of the report looks at the contributing factors toward a potentially successful self-sustaining market for domestic retrofit that could be supported by a one-stop-shop.

This diagram identifies the key factors, which in turn have many subsets. The presence of these factors and their relative maturity in the region will determine hose much work needs to be done to create a one-stop-shop. In the first instance its important to know what work needs to be done – the technical stuff – but understanding the housing stock that exists, what work needs to be carried. The we need to seek an understanding of the people living in them, their ability to pay for the work.

Figure A1 Local Retrofit Market Components



At the heart of the OSS model is the need to access people that understand a retrofit offer, desire it, engage with the OSS and thereafter the OSS has the ability to offer that customer the technical expertise and customer services levels. Those people have to spend money in order for the model to work.

The sub-region should seek to understand the number of homes that need particular types of work in order for us to clearly define the packages of work that will need to be delivered in the region and how those vary from local area to local area. This will assist in knowing where the customer that are most likely to buy from the OSS are located.

HOUSEHOLD INCOME IN C&W

The identification of higher income homes in the region is necessary to understand where to launch a one-stop-shop service. That is not to say that lower income homes are to be left behind. Clearly dealing with fuel poverty is a critical priority and all Local Authorities have demonstrated activity towards tackling this by accessing grant schemes on behalf of residents. To ensure that middle- and lower- income households are not left behind, a one-stop-shop could also serve as a gateway to available government backed grants, such as existing ECO4 grants, to facilitate greater uptake of retrofit measures in such households.

SCHEME DESIGN PARAMETERS

The nuances of particular delivery schemes are set out in a Scheme Design template that is agreed by all participants in advance of launch and of course able to be varied on an ongoing basis based on customer feedback.

The counterpoint to the careful structure of a scheme to make sure it runs smoothly, is that it includes attractive qualities that interest the buyer. Some elements have been mentioned earlier, but setting out the key elements:

- **Trigger points** – an offer/service to suit a key moment in the lift of the building.
- **First-up advice** – that advice is available for the homeowner that is appropriate for the moment they are in e.g. it may be energy-related but suited to the house buying process or if they are undergoing some disabled facilities adaptations.
- **Design** – that someone impartial is able to work with the homeowner to assure them that what is being proposed does suit them and the property and is not imposed by a contractor as their preferred choice.
- **Procurement** – that all customers are given a choice of contractor. Lack of choice is often a big criticism levelled at grant schemes.
- **Finance** – access to flexible, low interest finance in order to:

  - Provide an incentive to participate for customers
  - Support renovation packages that in themselves have long economic payback – any level of interest lengthens.
  - Avoid locking that loan to the home which may tarnish a sale.
- **The Supply Chain and Customer Protection** – setting out customers protections that are appropriate to the long term risk of the installation. It is also important to put protections in place for the supply chain in the event of customers that challenge the system to their advantage.
- **Other incentives** – to be developed over a longer period, the ability to provide incentives through the tax system or with cashback tools.

CREATING COST EFFECTIVE PACKAGES OF MEASURES

For the offers to be palatable to the homeowners, the packages of work presented must be accessible from a financial perspective both in terms of ability to pay and in the benefits they offer.

The entirety of work required on homes in C&W to meet the performance standards for 2050 is not light-touch. If a home has solid external walls, they will need to be insulated. If there are no technical barriers for a renewable energy technology, it is very likely that one will need to be installed. Many of these more significant energy efficiency measures will have long 'economic payback' i.e. that the time taken for the energy savings made to at least match the initial capital investment is longer than the investor's acceptable threshold.

There are several points to be made with regard to 'payback';

1. That a holistic package of measures that includes the simpler and more complex measures will have an overall payback lower than the that of the 'long measures' if viewed in isolation.
2. If this programme achieves good customer volumes and consistent workloads, married with the competitive pricing model that RetrofitWorks offers, market prices for work will drop, shortening the payback of measures.
3. Expressing marginal costs of energy efficiency, not the whole cost. Any energy work carried out at the same time as other renovation works will benefit from economies of scale, with the 'energy bit' already facilitated by the 'regular' work.
4. As energy prices rise over time, so the payback period shortens. If an offer works using current energy prices as static over time, then this initial assertion will only improve. However, given the unpredictability of energy prices, an inflation rate cannot be confidently built into any up-front offer to show this possible discount.
5. That most people only point to payback when they don't want to do something; nobody considers the 'payback' of a new kitchen, or a brand-new car that depreciates on the driveway. Therefore it is clear that there must be focus on the desirability of the outcome; for it to be aspirational; tangible improvements in control and comfort as well as function.

The retrofit challenge has always been to marry cost effectiveness with the need to install measures that are expensive and likely to pay for themselves over a long period of time. Minimising costs is therefore essential, and a few suggestions on how to achieve this are outlined above.

C&W RETROFIT RECIPE METRICS

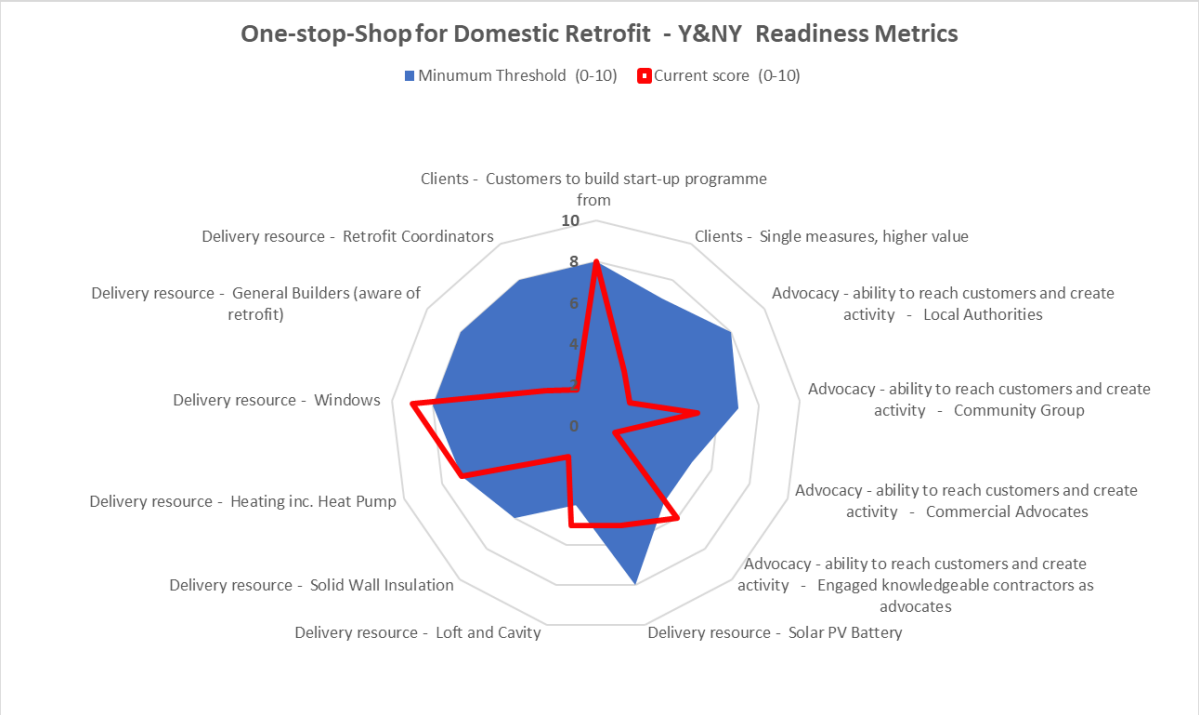
It is useful to take stock of the current ingredients that would make-up scheme within C&W and their level of maturity in the county and what work may be required to launch.

Table A2 Critical ingredients

Contractors	Contractors' presence in some areas or expertise or not others indicate where initial offers should focus and where effort should go to create the market.
Advocacy	The presence of willing and capable advocate to power the outreach and customer acquisition is key. Looking at different types of advocate - and at least one advocate group of strength is important. No or patchy advocates would suggest a scheme cannot go ahead.
Clients willing to pay for retrofit	There are some metrics which offer a steer on the type of customers that exist in the region as seen in Section 5.

The following graphic is an example of work carried out for North Yorkshire LEP for that region. With limited consultation it is not a science, but scoring based on lessons learned from the scheme Parity Projects has been involved in launching to date. It is a very useful tool, but more work needs to be done to delve into the presence of local capability.

Figure A2 – Example of one stop shop readiness metrics



(Scoring: 0 zero presence, 10 perfect at this time)

Table A3 Aspects to be decided during mobilisation

Marketing	Production of marketing collateral to suit the offer and reacting to the market research undertaken.
Customer Finance	Alignment with appropriate customer finance to remove this barrier to entry.
Impartial, Technical Service	Starting with free-to-use digital tools to aid customers in specific points of their home, through to trained local advisers.

Much more work needs to be done to understand the presence of contractors, surveyor and designers in the area and what they need to be trained on to work within a one-stop-shop structure.

THE CUSTOMER JOURNEY

The following sequence is what each customer follows within the successful Cosy Homes Oxfordshire scheme from which a C&W programme could be created:

Table A4 Customer Journey components

1. Assessment	2. Planning	3. Works
A. Homeowner registers following access to a free-to-use 'Plan Builder' online digital tool .	1. Homeowner signs a contract with the delivery organisation	1) Works carried out with Retrofit Coordinator oversight
B. Home assessment carried out	2. Quotes gathered. Contractors may visit the home.	2) Quality approval
C. Whole House Plan delivered (fee and questions answered	3. Homeowner signs a contract with the contractor/s	3) Homeowner makes final payment to the contractors

POSSIBLE CUSTOMER OFFERS

The OSS will need to stand its own two feet financially after an initial influx of start-up capital. To do this, it is critical that the service offers homeowners something that they genuinely wish to buy. A good offer to a customer will match what they are seeking (even if there is a requirement to educate the customer ahead of this) and be backed up by a support service and local construction professionals that are sufficiently competent and adequate in number.

The ability to deliver on all of the above will vary across the region, but to meet the ambitious targets locally, it must eventually be offered throughout. Those offers are not just for the homeowners; the industry supply chain must recognise it an a commercial environment within which they will thrive if they get involved. At the earliest stages, a OSS offer should align customer offers with the way that the building industry currently operates in order to widen their appeal, create the additionality to the market, and reduce costs of delivery with volume and certainty.

Each individual scheme option could align with market segments:

Table A5 Potential scheme market segment Alignment

Customers	The presence of more able-to-pay customers is throughout the region.
Customer Advocacy	A review of advocate groups across the region here
Supply chain – existing contractors	A review of contractors across the region here
Supply chain development – FE colleges	A detailed review of colleges across the region here

OTHER EXISTING SERVICES TO ALIGN WITH

There are a range of local services offered to homeowners that could benefit from access to the background infrastructure that we would build and from which the retrofit schemes could access potential customers.

Council Services

- ***Disabled Facilities Grants and Priority Repairs Schemes -*** Residents can qualify for grants to carry out adaptation and repair work in some boroughs. They have already accepted hassle so adding to the scope of the work to improve their home environment and reduce energy bills is an efficient way to adopt retrofit.
- ***Empty Homes Services -*** Grants and Loans, available in districts.
- ***Adult Social Services -*** as they work to support vulnerable residents in their homes.
- ***Trading Standards*** - who oversee the application of Energy Performance Certificates by Landlords and Homeowners as set down by UK Regulations.

Interventions by aligned Charities and Agencies

- The key premise here is that we would collaborate with existing services to train front line staff and give them access to our central retrofit database. Here is a small sample of such services:
- ***Handyperson services -*** (e.g. https://www.ageuk.org.uk/services/in-your-area/handyperson-services/)
- ***Fire and Rescue -*** carry out regular free checks in homes and install Smoke Alarms. This could be a great route to promote energy efficiency and potentially to collect non-personal data.

Utilities

- ***Water companies*** - they are giving advice and applying infrastructure upgrades to all homes. Taking advantage of all moments like this is a sensible approach and water companies could be engaged simply to collect data on our behalf.
- ***Smart Meter roll out*** - all homes need to have smart homes installed by 2025. Much has been written about how this programme can be a catalyst for other works and this could be engaged with centrally at DESNZ.

CARRYING OUT MARKET RESEARCH

Cleary one of the key risk elements of this scheme will be customer take up to match the projections. The p model can be nimble enough to tune the offers whenever we wish to, but getting something compelling first time around is very important.

Ipsos-Mori, which carried out the excellent research for DECC (now DESNZ) on customer views of heating system replacement options have been contacted. A comprehensive market research activity to test the offers presented here can be carried out for £100,000 but scaled back to the bare essentials for £70,000. This would include a combination of face-to-face workshops, telephone interviews of larger numbers, and some detailed follow on 20 customers in their homes.

This work would also be essential input to any national considerations and could be something that DESNZ would be interested in contributing some funding to.

FINANCIAL MODEL

This section looks into the costs and returns for the scheme when run as a profitable going concern.

The proposed business model is based on the following basic premises:

- The scheme applies a fee to the cost of the works being carried out in order to pay for the supporting services.
- The surpluses from each scheme offer are used to offset the cost of running the programme and paying back any initial investment (if investment is the determined method of financing).

The costs of these components are included in the start-up cost of the model and can be found in Appendix 4. Many of these elements could be funded separately should external support from regional or central government or other sources become available.

The table below sets out the key components of the financial model that we would use and the assumptions made in the analysis carried out. The scheme components can be altered in the cost model to close in on the best combinations and in this instance they are as follows:

Table A6 Potential Scheme Components

Types of retrofit job	Three jobs types: • **Large Job** • **Medium Job** • **Small Job**	
Survey to install time lag	3 months assumed between Whole House Plan and Install	
Admin team	Some part-time management time, grows as the scheme grows Call centre and admin staff grow with the outputs	
Retrofit Assessors	Paid per job	
Retrofit Coordinators	Full-time employed team that grows over time	
Scheme Infrastructure set-up costs	Data Strategy and Infrastructure	Onboarding and training of staff on digital tools Annual costs of home energy modelling tools, also used for targeted marketing.
	Knowledge and Skills	Training budget local retrofit coordinators Annual training staff allocation shared with other local orgs
	Procurement and Legal	Budget to ensure these items are resourced properly
	Eco Houses developed	No budget to create sample homes to visit
	HR	Very small share of local resource (3 days /month)
	Market research	Test the offer on local householders.
	Central marketing	Cost to cover brand development and local engagement, not much more. Expecting shared activity with local authorities.

PROJECT BUDGET AND FINANCE REQUIRED

The following graphics set out examples of key assumptions made on output and income, once a full analysis is undertaken. Please note that the number of homes tackled in the calculations are deliberately conservative, set to understand the minimum number required to sustain the income for the scheme to

sustain and grow. The outputs used in this model reach only 1.09% of the housing stock of the region by the end of Year 7, so once the model is proven (whether in Year 1, 2, or 3) it must be pushed a lot harder to make an appreciable difference. The key to this model is that it will generate a surplus if handled correctly and the finances tabled are the minimum output needed, not 'optimistic projections'.

Figure A3 Number of retrofits by quarter

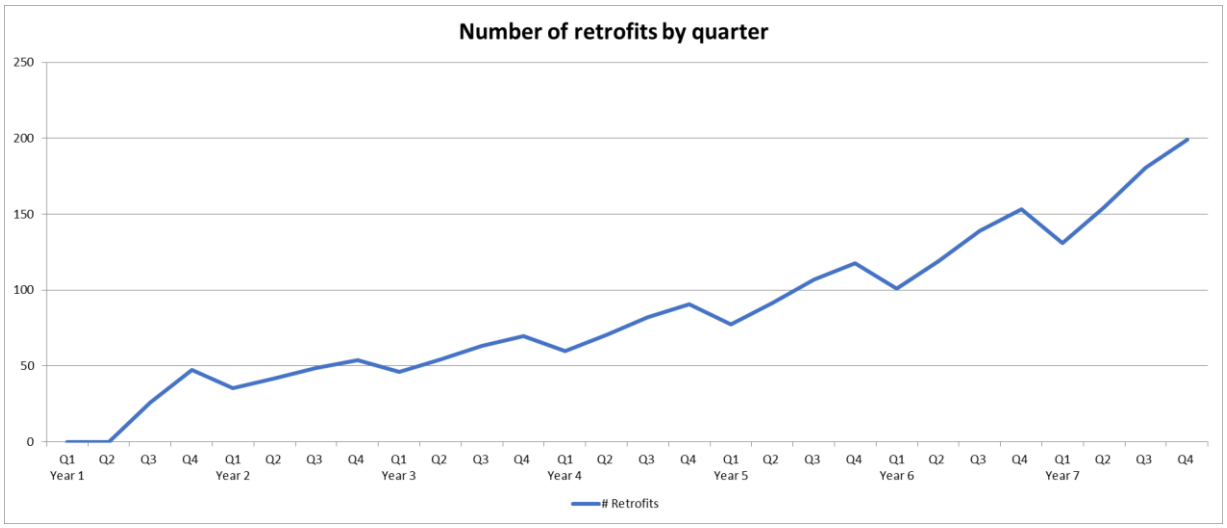
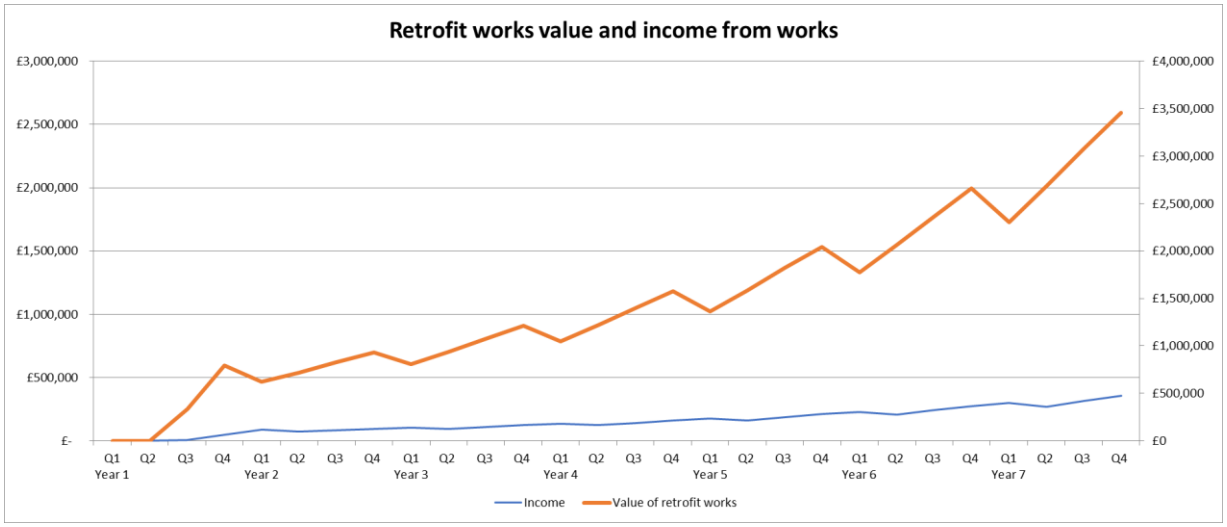


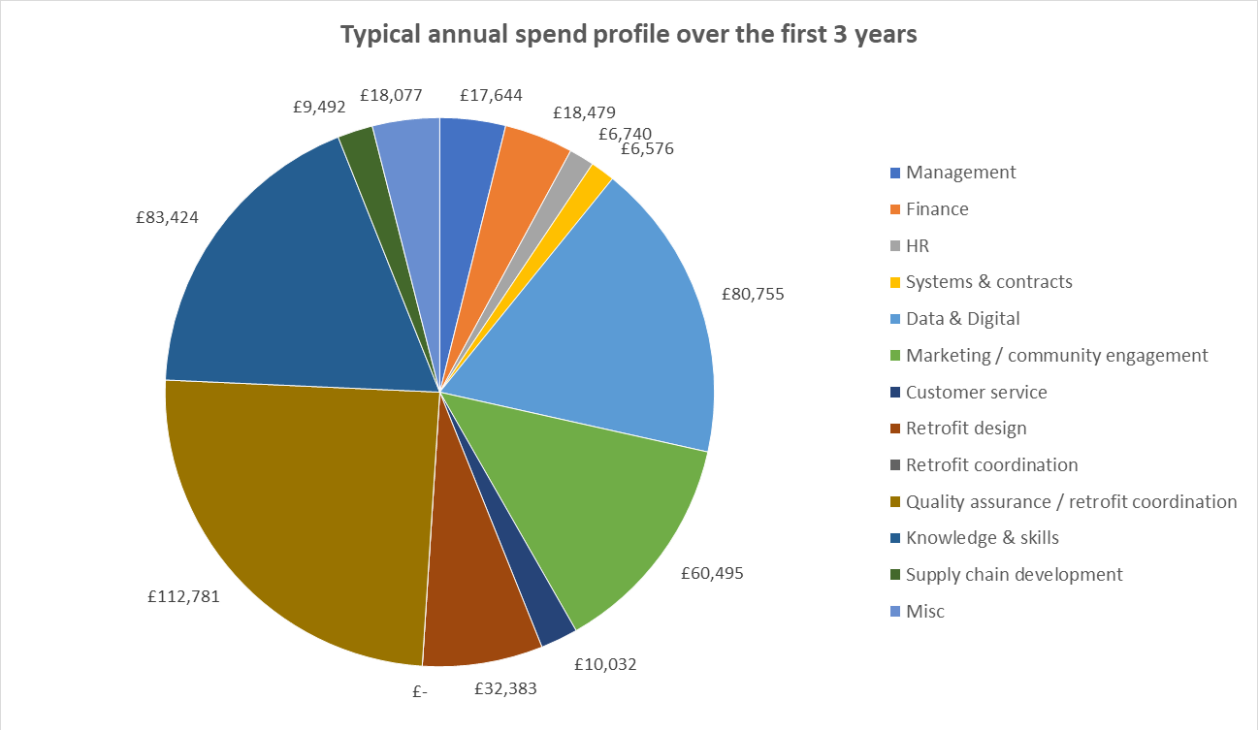
Figure A3 Retrofit works value and income from works



The overheads of the scheme model contain ongoing annual costs. By way of illustration, a summary of the

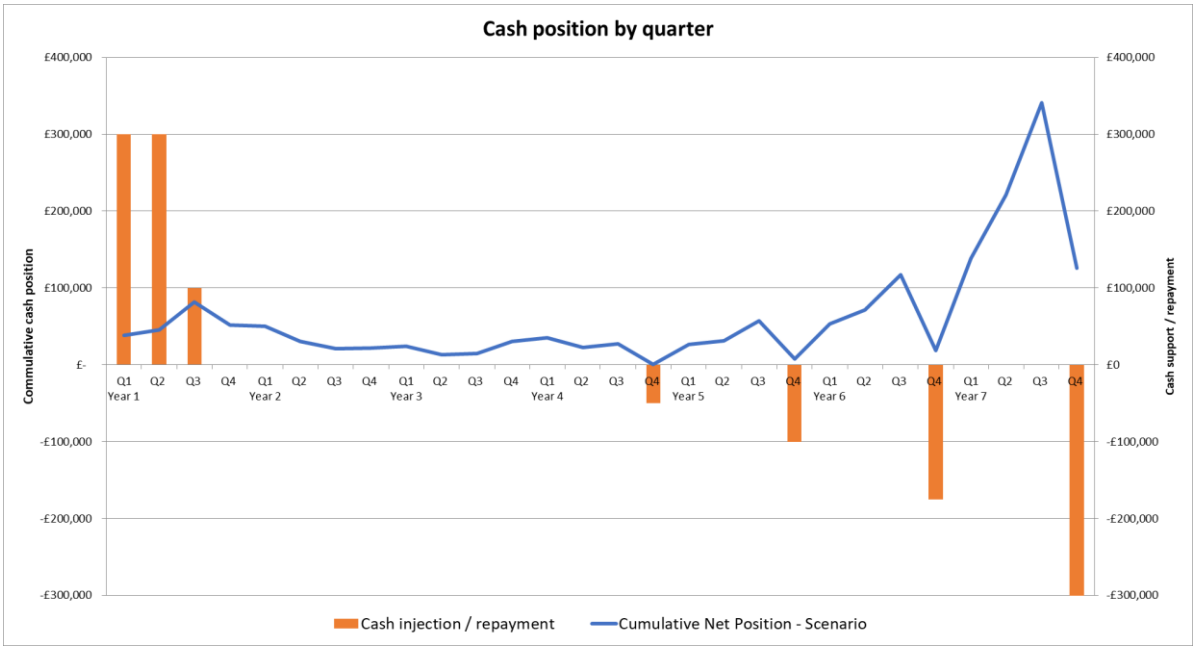
annual costs can be seen here based on an average over the first three years:

Figure A4 Typical annual spend profile over the first 3 years



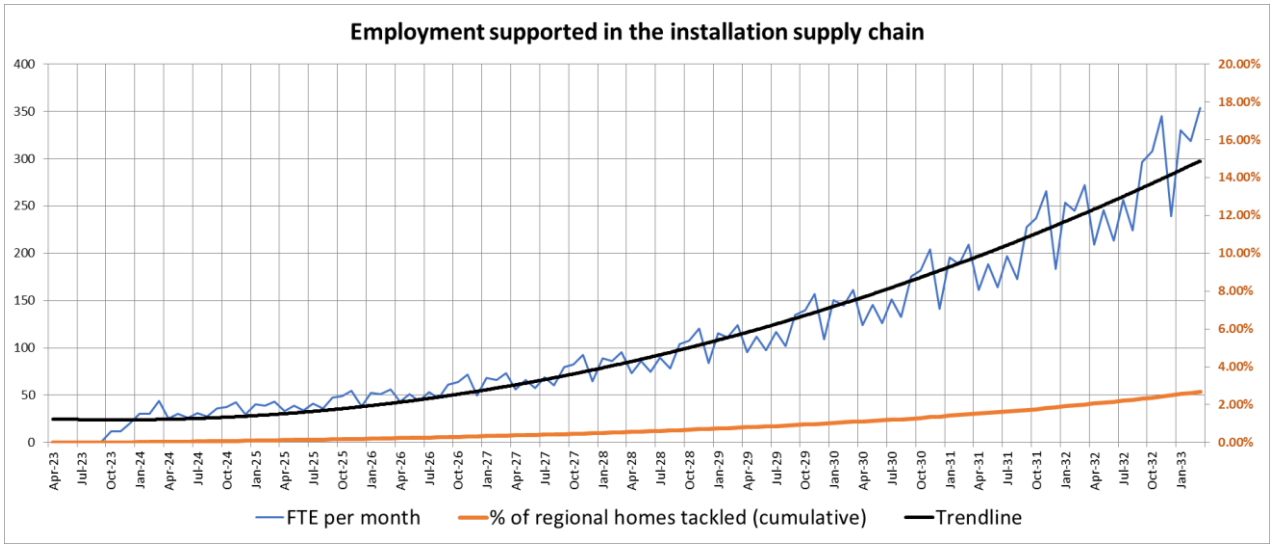
The cashflows of the scheme would be set out with graphs for illustration. The working capital in this example is supported by an inflow of cash of £700,000 in the first year for setting up the considerable infrastructure required to get started, re-payable in full after 7 years.

Figures A4 Cash Position by quarter



This example scheme would create local jobs. The calculation on this is set out below bs generated for both schemes are set out below, not including the employment required to run the scheme itself.

Figure A5 Employment supported in the installation supply chain



COMMERCIAL MODEL

Based on the mix of ingredients currently identified above, there are a number of commercial model options that could underpin a regional retrofit programme. Consideration has been given to the expertise required in each key area of provision and where that would reside.

The pros, cons and considerations of the model options are laid out on the next pages but none have yet been discussed with local authority representatives in legal, procurement or finance teams.

The ideal model type for the region will emerge from discussions around risk and where the money will come from to create the model. There are three key areas of concern at the apex of these options:

1. Who takes the local lead for fundraising and what responsibility and control do they assume over the model.
2. The delivery entity for the OSS itself.
3. The role of Local Authorities in other of the above: Local Authority legal and procurement teams will need to be approached to gauge their appetite for risk in order to understand which model suits the region best.

Within each of these models, there are means to creating the main components for C&W. Here are some of the options:

Option 1) **Transferable model:** Bring an existing retrofit model to C&W from elsewhere. There are not many but RetrofitWorks and People Powered Retrofit are two that could work. The consortium itself would raise the finance and retain all key decisions, take on all risks and retain any surpluses.

Option 2) **Facilitate new organisation:** As 1, but Local Authorities could contribute to the scheme finance required and agree a stake in the surpluses generated (Risk-Reward exchange)

Option 3) **Create a new organisation:** Create a new organisation rather than bring one to the region. The new organisation would be wholly owned. Align Property Partners could already be that organisation.

Option 4) **Procure a concession contract:** This option was introduced based on the fact that after consultations it was deemed that some kind of procurement was likely to be added to demonstrate due diligence. Concession contracts in effect would lend a local authority logo to the self-sufficient programme.

Option 5) **Procurement and contract management:** Procurement of an external organisation based on a clear specification. Resources would be needed at the procuring organisation on an ongoing basis to police the contract and its SLA's. This could be C&W or any of the LA partners.

Appendix 2 – Full list of stakeholder engagement

Organisation Engaged	Type of Organisation
British Gas Social Housing Ltd	Energy Efficiency Installer
Energy Projects Plus	Advocacy Organisation
ENWL	DNO
Heylo Housing	Affordable Housing Landlord
Legal and General Affordable Homes	Social Landlord
Muir Group Housing	Social Landlord
National Grid Energy Distribution	DNO
Pure Leapfrog	Advocacy Organisation
Secoli Green Home Consultancy	Organisation
SP Manweb	DNO
Torus Developments	Social Landlord
Warrington Chamber of Commerce	Economic Growth
West Cheshire and North Wales Chamber of Commerce	Economic Growth

Appendix 3 – Home analysis to demonstrate heat pump installation sequence criticality

EPC last carried out 14/08/2021

Property Summary

Age:	B: 1900-1929	**Glazing:**	94% Double glazing unknown age, 6% Single Glazing
Property Type:	House: EndTerrace	**Heating:**	Boiler: C rated Combi
Walls:	SolidBrick: AsBuilt	**Main Fuel:**	Gas: Mains Gas
Roof:	PitchedNormalNoLoftAccess: No Insulation		

Base data: LINK TO PATHWAYS

Note that the energy bill goes up if the heat pump is installed as the first measure. If preceded by demand reduction (loft insulation) it contributes to a reduction in bills. In both cases, the heat pump contributes to a large reduction on CO_2 emissions.

Heat Pump First

				SAP Results		Bill Results		SAP 10.2 tCO_2		2050 tCO_2		kWh/m²		Heat Pump	
	Name	Cost	Cumulative	Current	Lab	Current	Lab	Current	Lab	Current	Lab	Current	Lab	Model Index	Transfer Coeff.
↓ ↑	ASHP (45 degree emitters) with enhanced existing radiator central heating and hot water, from C rated gas boiler edit	£15,000.00	£15,000.00	49.47 E	36.15 F	£1,274.08	£1,632.15	5.997	6.422	5.917	6.422	277.9	111.1	104169	584.6W
↓ ↑	300mm loft insulation from 0mm - no access to loft edit	£2,483.00	£17,483.00	49.47 E	52.04 E	£1,274.08	£1,210.94	5.997	4.765	5.917	4.765	277.9	82.5	104169	464.3W
↓ ↑	Install PV system where potential has been identified edit	£5,190.00	£22,673.00	49.47 E	57.30 D	£1,274.08	£1,071.07	5.997	4.214	5.917	4.214	277.9	72.9	104169	464.3W
↓ ↑	A rated double glazed casement windows from partial single glazing edit	£12,776.00	£35,449.00	49.47 E	59.34 D	£1,274.08	£1,022.83	5.997	4.025	5.917	4.025	277.9	69.6	104169	440.5W
↓ ↑	External insulation (150 mm) to 1900-1929 solid walls edit	£30,378.00	£65,827.00	49.47 E	83.75 B	£1,274.08	£408.24	5.997	1.606	5.917	1.606	277.9	27.8	104797	239.3W
↓ ↑	Two Part L insulated doors (all doors) edit	£3,000.00	£68,827.00	49.47 E	84.01 B	£1,274.08	£401.27	5.997	1.579	5.917	1.579	277.9	27.3	104797	233.4W
		£68,827.00													

Loft insulation first

				SAP Results		Bill Results		SAP 10.2 tCO_2		2050 tCO_2		kWh/m²		Heat Pump	
	Name	Cost	Cumulative	Current	Lab	Current	Lab	Current	Lab	Current	Lab	Current	Lab	Model Index	Transfer Coeff.
↓ ↑	300mm loft insulation from 0mm - no access to loft edit	£2,483.00	£2,483.00	49.47 E	57.16 D	£1,274.08	£1,083.43	5.997	5.735	5.917	5.735	277.9	229.6	n/a	467.7W
↓ ↑	ASHP (45 degree emitters) with enhanced existing radiator central heating and hot water, from C rated gas boiler edit	£15,000.00	£17,483.00	49.47 E	52.04 E	£1,274.08	£1,210.94	5.997	4.765	5.917	4.765	277.9	82.5	104169	464.3W
↓ ↑	Install PV system where potential has been identified edit	£5,190.00	£22,673.00	49.47 E	57.30 D	£1,274.08	£1,071.07	5.997	4.214	5.917	4.214	277.9	72.9	104169	464.3W
↓ ↑	External insulation (150 mm) to 1900-1929 solid walls edit	£30,378.00	£53,051.00	49.47 E	82.85 B	£1,274.08	£431.49	5.997	1.698	5.917	1.698	277.9	29.4	104797	263.1W
↓ ↑	A rated double glazed casement windows from partial single glazing edit	£12,776.00	£65,827.00	49.47 E	83.75 B	£1,274.08	£408.24	5.997	1.606	5.917	1.606	277.9	27.8	104797	239.3W
↓ ↑	Two Part L insulated doors (all doors) edit	£3,000.00	£68,827.00	49.47 E	84.01 B	£1,274.08	£401.27	5.997	1.579	5.917	1.579	277.9	27.3	104797	233.4W
		£68,827.00													

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