

Domestic Retrofit Market Intelligence and Skills Assessment

GSENZH

Rob Hargraves
Zoltan Karpathy
Peter Griffin

Energy Systems Catapult
LCP Delta
Parity Projects

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	Name	Position
Author	Rob Hargraves	Retrofit Skills Advisor
Reviewer	Denis Richard	Business Leader - Project Management
Approver	Marc Brown	Interim Business Leader - Homes

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1. Introduction

1.1. Background

To meet the Government's 2050 Net Zero target, the UK's housing stock must be decarbonised, and spiralling energy prices have sharpened the focus on the need to reduce energy demand in our homes as hundreds of thousands¹ more households will be plunged into fuel poverty this winter.

On the 9th of November 2022 the Climate Change Committee (CCC) wrote a letter² to the Chancellor of the Exchequer titled: Reducing energy demand in buildings in response to the energy price crisis.

Spiralling energy prices have sharpened the focus on the need to reduce energy demand in our homes as hundreds of thousands more households will be plunged into fuel poverty this winter. The letter outlines the Committee's advice on how to address what it says is now "the biggest gap in current Government energy policy".

Retrofitting the UK's housing stock will help to tackle three of the biggest issues we currently face as a nation, namely the climate crisis, the cost of living, and our energy security.

The Energy Price Guarantee (EPG) will have potentially cost the Government up to £66 billion by April 2023 and despite this, households will still be paying extra on their bills. There has never been a better case for retrofit and the CCC recommends a suite of measures, such as enhancing the Government's energy advice service and raising the profile of public awareness campaigns, alongside practical suggestions on how it will be paid for and delivered.

Crucial to this much needed, and overdue acceleration of retrofitting the UK's homes will be ensuring that we have the workforce, and the skills, to be able to deliver it. The CCC recognise that this is one of the key barriers that must be overcome to achieve our aims and proposes that programmes are introduced to train new entrants into the sector and to up-skill the existing construction workforce and those who will be moving into more specialised occupations.

¹ <https://www.nea.org.uk/news/8-2-million-uk-households-could-be-in-fuel-poverty-from-october/>

² <https://www.theccc.org.uk/publication/letter-reducing-energy-demand-in-buildings-in-response-to-the-energy-price-crisis/>

Although rather overtaken by recent geo-political events, the Government had already made efforts to establish green growth through its Heat & Buildings Strategy (2021), Net Zero Strategy (2021), the Prime Minister's Ten Point Plan (2020), Industrial and Clean Growth Strategies (2016) and the Energy White Paper published in December 2020. National energy policy on carbon emission abatement is a driving factor shaping policy at a local level.

National policy to decarbonise heat acknowledges it is easier to achieve national targets on decarbonisation if it is done at a local level: for example, targeting buildings and delivery of local heat networks.

However, the scale of the challenge nationally and regionally is vast: domestic heating alone accounts for one third of total UK carbon emissions³; to achieve the 2050 target of an 80% reduction in carbon emissions (CO₂), the UK must decarbonise the domestic heating market at a rate of 20,000 homes per week by 2025. This means moving away from natural gas fired boilers to new low carbon heating systems; the current rate is less than 20,000 a year.

The development of skills will require a strategic approach, in which some elements are best tackled in a coordinated national approach, and some will be delivered locally. At a time when spending cuts are being announced, it is critical that the entire skills 'eco-system' is planned for and delivered. Collaborative action on skills development is required.

1.2. Project Overview

The Greater South-East Net Zero Hub (GSENZH) has commissioned Energy Systems Catapult (ESC), in partnership with Parity Projects and LCP Delta, to undertake domestic energy efficiency skills sector assessments to help understand the current state of the sector and where support is needed to help grow this sector across the greater South-East region.

The project assessed current retrofit-specific training provision across the region, forecast the future skills requirements to decarbonise domestic properties in line with the Government's 2050 Net Zero target, and this report lists the recommendations for action over the next 5 to 10 years.

³ DECC, Digest of United Kingdom Energy Statistics, 2016

2. Skills Landscape

Previous attempts to stimulate the uptake of measures in the retrofit sector, such as the Green Homes Grant most recently, have demonstrated the necessity of taking a whole systems approach. If funding is available but a skilled workforce is not in place, then uptake will be low because the consumers' retrofit 'journey' will be negatively affected.

It is imperative to keep the consumer perspective at the forefront of our thinking when creating a strategy for delivering retrofit skills, as the workforce needs to have the training and skills available to answer all of the questions and issues that are naturally raised during what can be a very complex process (see Figure 1 below) and deliver a quality retrofit installation and experience that will deliver the intended results for the consumer.

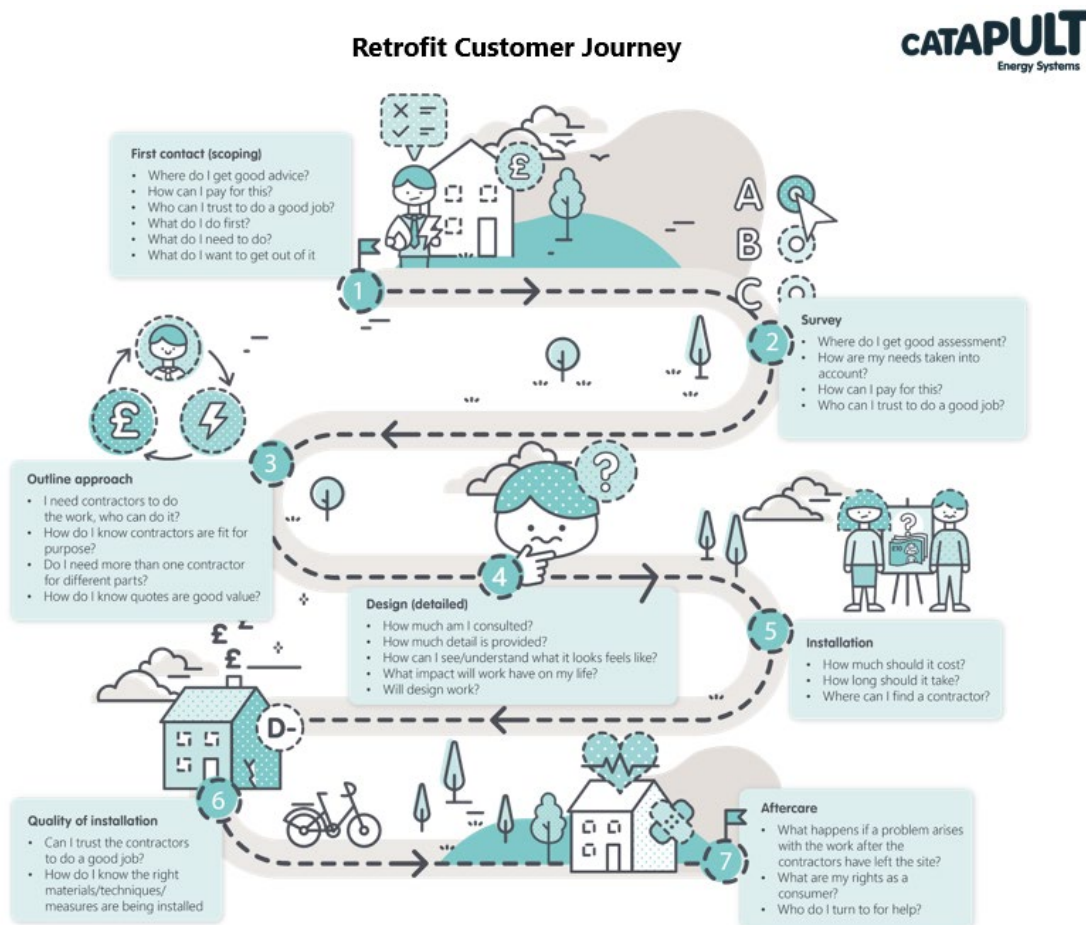


Figure 1: The complexity of the retrofit customer journey

If the customer journey is not a smooth one then trust and confidence in the process will be lost, and the public will choose not to continue with the installation of measures.

The retrofit sector cuts across many different trades and is notoriously fragmented, which doesn't make things easy when trying to create a seamless customer journey. With so many different actors

involved, it is a challenge to create a joined-up approach to training, but it will be critical that there is national coordination where appropriate, so that standards and curriculum for example are consistent across the country, and so that the workforce has a clear qualification/training pathway.

Figure 2 outlines all the elements of the retrofit sector that must be addressed to successfully decarbonise the homes in the Greater South-East region. If gaps remain then the customer outcomes will suffer, and as a result the scale of high-quality retrofit required to meet our Net Zero targets will not be possible.



Figure 2: Retrofit skills 'eco-system'

There is excellent and innovative work being done in pockets of the retrofit sector, but without coordination and collaboration there will inevitably be resources that are wasted and efforts that are duplicated - two things that we can ill afford at a time when public spending cuts are on the table.

Actors within the sector need to see certainty in terms of Government policy to help drive demand for skills, and then themselves show a willingness to work together to simplify and improve the training landscape.

Whatever the training of the future looks like, it will need to be flexible and adaptable to accommodate new technologies and ways of working.

The various market enablers involved in retrofit are listed below, and again, to accelerate and ensure the highest quality of retrofit in the region these elements will need to be working to a unified goal. In Section 5 we examine the policy landscape and in Section 10 we look at some of the latest developments in digital tools and platforms that are driving well-planned and executed retrofit.

Market
Enablers

- 1 Digital Tools – Design, Pathways, Evaluation
- 2 Digital Platforms – Data sharing, trading
- 3 Policy – Regional / National
- 4 Funding – Public / Private
- 5 Awareness – Domestic and non-domestic customers, schools / colleges
- 6 Supply Chains - Employers

Figure 3: Market Enablers

3. Current Training Provision

The scope of this section is to provide an overview on the qualifications and training routes for the installation roles of selected low carbon technologies and key roles in energy efficiency (i.e. retrofit assessors / designers / coordinators and domestic energy advisors).

LCP Delta aimed to highlight the key qualifications required to meet common accreditation and certification schemes and as many other training courses as the budget allows. As part of the project, we carried out desk research to identify qualifications for certain aspects of the supply chain, especially around installation and linked to standards and other training courses and curriculum central to this field (such as training courses offered by manufacturers and modern apprenticeships).

3.1. Qualifications linked to standards

Most low carbon technology training courses identified focus on heat pumps and solar thermal/solar PV/battery storage. Thermal insulation installer courses are typically training workforce in entry level roles to obtain NVQ qualifications.

The heat pump installer courses are typically short and designed to demonstrate competency of experienced heating installers towards MCS certification.

Training courses related to solar thermal and solar PV installation are also designed to demonstrate competency towards MCS certification. Solar PV training courses include battery storage, but they do not cover energy efficiency, as well as integration with other energy efficiency measures.

For retrofit designers, coordinators and assessors, the PAS 2035 standard will drive demand for appropriately qualified professionals. PAS 2035 specifies that all domestic retrofit projects will need to use an accredited retrofit coordinator and it also stipulates that all retrofit coordinators must hold Level 5 Diploma in retrofit coordination and risk management before they can join one of the TrustMark-approved Schemes.

Although PAS 2030 is a driver, currently there are no requirements for home energy system integrators, smart heating control installers, heat network installers and domestic energy advisors to be qualified according to a standard.

3.2. Types of training courses

Colleges are mainly offering training on the core skills, while independent training providers mostly offer shorter, specialised courses.

Apprenticeships are offered by employers in cooperation with independent training providers or colleges with a length of several years. In addition to this, apprenticeships with a focus on retrofit and low carbon heating technologies are still in development and it is unclear whether all required measures will be covered.

The training courses offered by manufacturers/distributors are brand / model specific. These do not provide formal qualifications but offer practical knowledge regarding installation and ensure that installers are up to date with the latest standards and technological advancements.

3.3. Qualifications and training per technology and sub sector

The detailed list of required qualifications for the various low carbon technologies are included in the Qualifications table in Annex 1.

1. Ground and/or air source heat pump installers

There are several qualifications which can be obtained to demonstrate heat pump installation competency towards MCS certification, including BPEC, City & Guilds, LCL and EAL qualifications.

By completing the training courses, installers can obtain one of the listed qualifications, however there is no clarity on the training pathway. The training courses offered by heat pump manufacturers are brand / model specific and, although they enhance practical knowledge, these do not provide formal qualifications.

2. Home energy systems integrators

There are no formal qualifications related to the home energy system integrator role. Instead, responsibility lies within each individual trade (e.g. plumbing and electrical). Individuals trained in these disciplines do not have a formal education to assess compatibility of the various technologies, how these interact with each other and the interfaces between the different control systems.

3. Solar Thermal /PV installers

Several qualifications can be obtained to demonstrate competency towards MCS certification.

There are several qualifications which can be obtained to demonstrate solar thermal / solar PV installation competency towards MCS certification (including BPEC, City & Guilds, LCL and EAL qualifications among others). By completing the training courses, installers can obtain one of the listed qualifications, however there is a lack of clarity on the training pathway.

Some solar thermal / solar PV manufacturers / distributors are also offering installation training, but this is brand / model specific and do not provide formal qualifications.

4. Battery storage installers

There are no formal qualifications and no defined pathway to the role of battery storage installer. To comply with MCS accreditation, battery storage installers need training / experience of solar PV systems in accordance with standard requirements. Solar PV training courses also include battery storage.

Some solar PV technology / battery manufacturers / distributors are also offering installation training, but this is brand / model specific and do not provide formal qualifications.

5. Insulation installers

Vocational qualifications (NVQ), apprenticeship, and Electrotechnical Assessment Specification (EAS) compliance route were identified as qualifications for thermal insulation installers.

Training courses seem to be specialised in certain aspects (e.g. loft or cavity insulation) and they are not coordinated with other low carbon / energy efficiency trades.

6. Smart heating controls installers

There are no formal qualifications and pathway to the role of smart heating controls installer.

Training for smart heating controls is covered by the individual trades (e.g. plumbing/electrical courses). Nevertheless, training courses do not explicitly contain how the various systems need to be integrated with suitable controls and interfaces to link the different smart heating control systems.

7. Domestic energy advisors

Up until the last 12 months, qualifications and training for energy advice have been focussed on fuel poverty (covering basics related to energy bills, energy efficiency and existing energy efficiency related incentives/subsidies), however The Retrofit Academy has recently introduced a Level 3 Certificate in Domestic Retrofit Advice.

8. Heat network installers

Vocational qualification (e.g. NVQ Level 2 and 3 plumbing and heating qualification), apprenticeship, or EAS compliance route are the potential qualifications for heat network installers.

Training courses do not seem to be coordinated with other low carbon / energy efficiency trades.

9. Retrofit designers

A retrofit designer can choose between the following qualifications and pathways to be able to prepare a retrofit design:

- Path A: Level 5 Diploma / MCIAT
- Path B: Level 5 Diploma / MCIAT plus registered Architects, Construction Managers and Building Surveyors.

However, these qualifications are not compulsory, and many companies are designing systems without formal qualifications.

10. Retrofit coordinators

A retrofit coordinator must be qualified to be able to assume overall responsibility for each stage of the retrofit project. Professionals must obtain Level 5 Diploma in Retrofit Coordination and Risk Management and demonstrate prior experience and competence in professional practices such as contract management, project management, customer service etc.

11. Retrofit assessors

A retrofit assessor needs to be qualified to carry out dwelling assessment and supply data to the Retrofit Coordinator:

- Path A: Level 5 Diploma in Retrofit Coordination and Risk Management
- Path B&C:
 - Domestic Energy Assessor
 - Specialist Level 3 and 6 awards in traditional buildings (Path B and C for protected buildings).

Training courses only seem to be covering the basics of retrofit.

3.4. Training provision in GSE area

The scope of this section is to summarise the training provision identified related to low-carbon technologies / energy efficiency in the Greater London / East / South-East England region. To gather this, LCP Delta carried out desk-based research to identify the training providers and the low-carbon technologies related training courses offered by these in the GSE region. Given the size of the region, it was not possible to produce a comprehensive list of all active training providers as part of this project; instead, we aimed to provide as a comprehensive list as possible of the most relevant training providers in the region. Following the completion of desk research, LCP Delta carried out several stakeholder interviews to verify the information gathered and collected further key insights into training provision in this sector.

According to the Association of Colleges (AoC), in August 2022 there were 273 colleges in the UK, of which 228 were located in England. These are broken down further as below:

- 161 General Further Education colleges
- 44 Sixth form colleges
- 11 Land-based colleges
- 10 Institutes of adult learning (formerly specialist designated colleges)
- 2 Art, design and performing arts colleges.

Of the 228 colleges located in England, 34 were in the South-East region, 22 in the East region and 33 in Greater London. Of the 161 General FE colleges in England, 23 were in the South-East region, 18 in the East region and 16 in Greater London. There were 7 Sixth form colleges and 1 Specialist designated college in the South-East region, 4 Sixth form colleges and 0 Specialist designated colleges in the East region while the Greater London area hosted 8 Sixth form colleges and 7 Specialist designated colleges.

The list of training providers and courses identified during this project can be found in Annex 2.

Most training courses identified during this project are offered face-to-face, at a physical location, as seen in Figure 4 below.

Training course types offered in GSENZH region

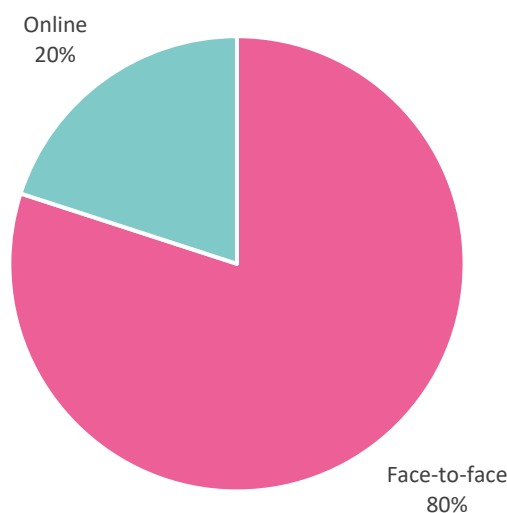


Figure 4: Training course types

During the Covid-19 related lockdowns in the 2020-2021 period there was an increase in online courses, but this trend has reversed since then. The practical aspect of these skills cannot be studied efficiently via online-only training courses and training in physical locations regained popularity.

Most specialist training courses for low carbon technologies and roles are offered by independent training providers. These are mainly short courses taking place at a physical training location, but there are also a number of online courses offered (see Figure 5).

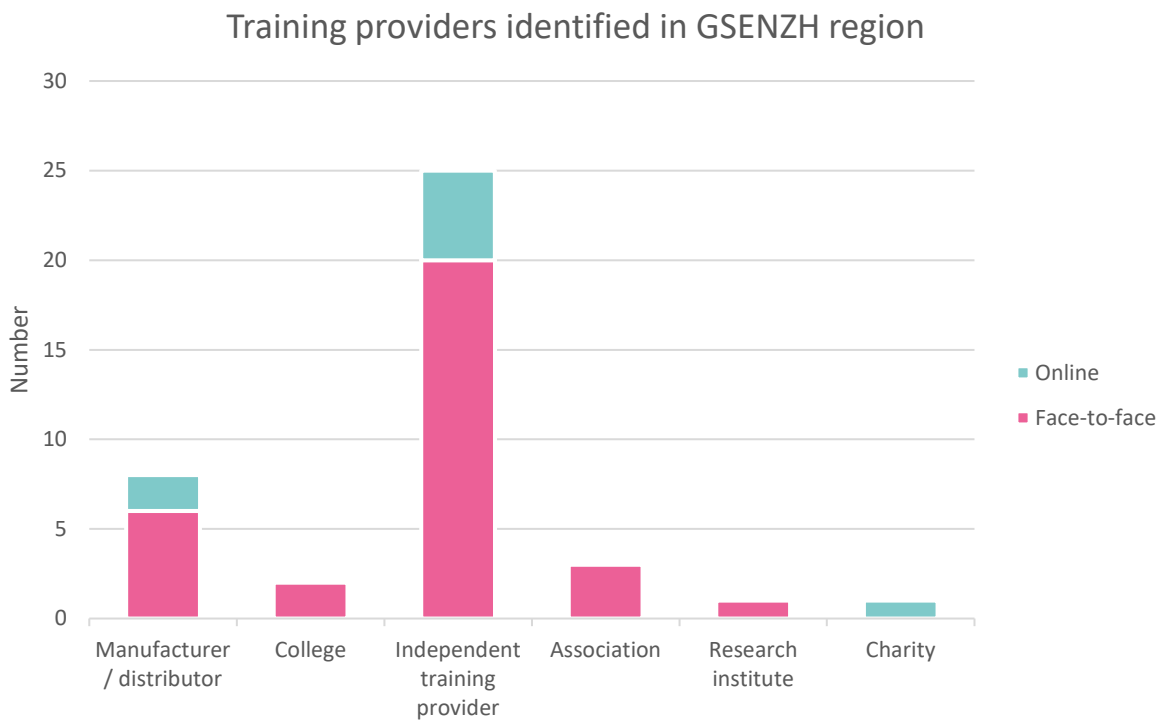


Figure 5: Training provider by type

Manufacturers/distributors of low carbon technologies are playing a key part in training installers, especially for upskilling already experienced heating installers in heat pump, solar PV, solar thermal and battery storage installations to comply with MCS requirements. These short courses are brand and/or model specific, but do not provide formal qualifications. The larger manufacturers typically organise their own training courses, while smaller ones can cooperate with independent training providers.

Colleges and universities seem to be lagging behind in offering dedicated low-carbon technology related training courses (although they may have low carbon technology related modules in their current curriculum), while various associations and research institutions (e.g. CIBSE, BRE, Retrofit Academy, EST) are actively offering dedicated training courses.

The majority of low carbon technology training courses identified in the GSE area are related to air-source and ground-source heat pump installation. Training courses for solar thermal / solar PV were identified as the second most prevalent in the GSE region. There is an increasing interest for retrofit assessor/designer/coordinator courses and a variety of training providers have added these to their portfolio.

4. Industry Needs

To assess the shortfall in the skills required to meet Net Zero we need to estimate the work required to transform housing in the region and the skills required to do it. We have done this by modelling the performance of all homes in the GSENZH area today and assessing what work is required to bring them up to Net Zero standard. Our analysis indicates that meeting Net Zero requirements across all housing in the GSENZH area requires around 46,500 full time equivalent workers each year to 2050.

4.1. Methodology

The modelling was performed using Parity Project's Policy tool, which uses a statistical dataset built from the English Housing Survey (EHS) 2019-2020.⁴ This is a national survey of people's housing circumstances and the condition and energy efficiency of housing in England. This dataset is based on surveys from 2018-2020 and was the latest available for this study. The EHS data is published as a statistical dataset of 12,300 homes, each of which has a scaling factor to indicate the number of similar homes it represents. This way all homes in England are described.

Parity Projects has processed the detailed datasets from the EHS in order to build a complete description of the energy performance of each home using reduced data Standard Assessment Procedure (rdSAP) format. This is used to generate domestic energy performance certificates (EPCs). Most of the fields required to build the rdSAP model were populated from the EHS directly, but some details were populated by *Parity Projects*. For example, the make and model of boilers is not recorded in the EHS dataset. *Parity Projects* used their knowledge of the UK housing stock to populate with a typical range of boiler models to represent the range of efficiency, improving the *Policy* model accuracy significantly.

For this project we needed to restrict the data to just homes within the GSENZH area. The EHS data gives the location by region, while the boundaries of the GSENZH do not follow regional boundaries. We therefore selected all homes in London and the East of England and then a sample of the South-East to match the population of the included local authority areas in the South-East, as well as West and North Northamptonshire. This approach was agreed with the GSENZH.

⁴ [English Housing Survey 2019: Housing Stock Data: Special License Access](#). Ministry of Housing Communities and Local Government. (2022)

This dataset was then modelled using *Parity Project's Policy* tool to predict the EPC score, CO₂ emissions and energy use of each home in the EHS to provide a representative energy performance model for all housing in the GSENZH area.

4.2. Baseline Results

The EHS dataset contains just under 10 million homes from across the GSENZH area. The median EPC score of these homes is 68.9, which is at the very boundary between EPC D and C. This means that half of homes are at risk of fuel poverty under the Government's definition (subject to income)⁵. Figure 8 shows the distribution of homes between the EPC bands. 88% of homes are currently rated either EPC C or D.

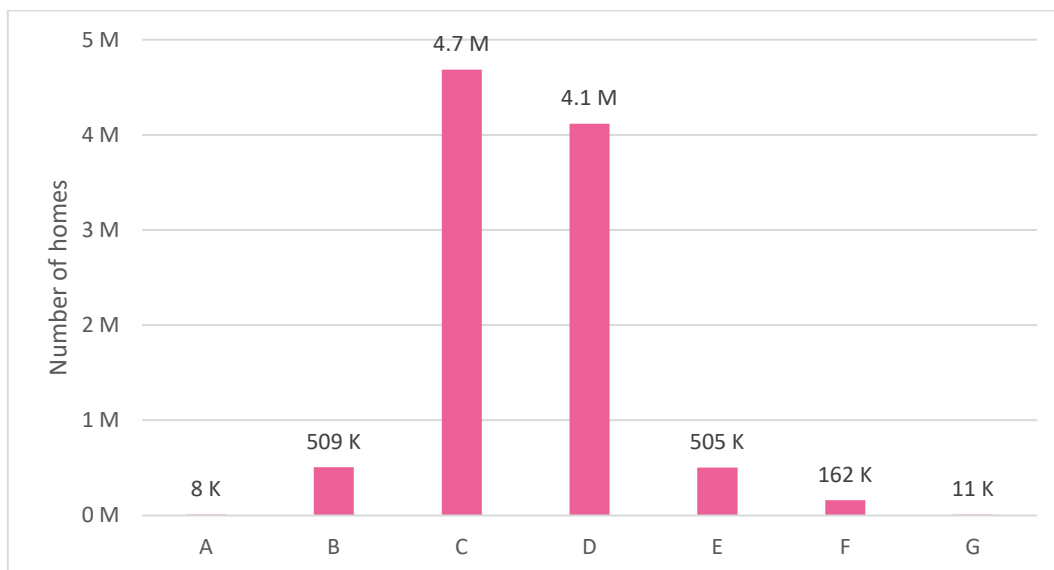


Figure 6: Distribution of existing homes by EPC band

The total annual emissions resulting from homes in the area is 30 million tonnes of CO₂, with the median home emitting 2.6 tonnes.⁶ Like all this analysis, these values make standard assumptions about occupancy behaviour, as defined in SAP and include only regulated energy use, e.g. heating and lighting. Energy use from cooking and other appliances is not included.

⁵ BEIS, [Fuel Poverty Statistics](#), February 2022

⁶ Using carbon factors, as [defined in SAP 10.1](#)

A key challenge of reaching Net Zero is decarbonising heating systems. Currently, like most of the UK, the vast majority of homes are heated through the direct burning of fossil fuels, principally mains gas. Figure 9 shows the extremely high number of homes that will need to be converted away from direct fossil fuel heating to a low carbon option. Only 0.06% of homes in the area currently have a heat pump.

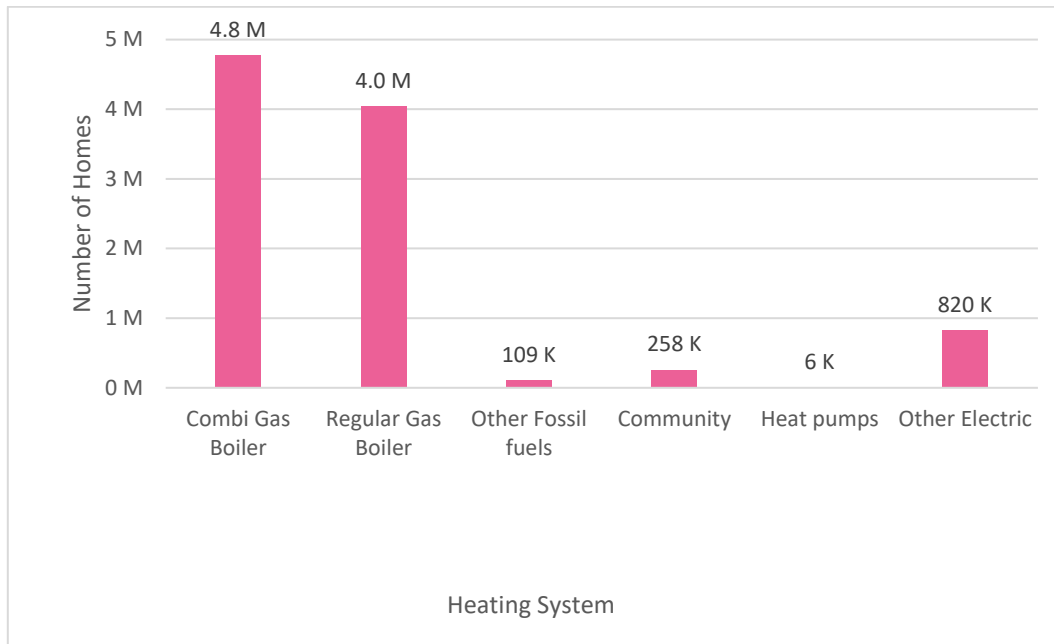


Figure 9: Distribution of existing homes by heating system

4.3. Characterising Decarbonisation Targets

Characterising the changes required to the housing stock has used Government targets of:

- All homes to EPC C by 2030
- Net zero by 2050

The first of these is easy to characterise in our model, as the EPC score is a defined metric within rdSAP. For each home the model finds the most cost-effective route to improve the EPC score to band C using fabric measures and low carbon heating. PV was then considered for homes that did not reach EPC C through fabric and heating measures alone.

The requirements for homes under net zero is more complex. We cannot reach Net Zero if we continue to use gas for heat.⁷ This means that all gas boilers, and other fossil fuel heating must be replaced with low carbon heating. Electrification will be the predominant method for decarbonising

⁷ [Taking stock of the UK Government's Heat and Buildings Strategy](#), Climate Change Committee, 9th March 2022

heating through a range of methods. We modelled the proportion of homes receiving each heating system as follows:

Heating system	Proportion of homes
Air source heat pump (ASHP)	64%
District heating	13%
Resistive Electric heating	12%
Ground source heat pump (GSHP)	11%

The percentages used here are the same as those for the decarbonisation scenario of ESC's 2022 Local Area Energy Plans for the Greater Manchester region. This scenario is a model of the lowest overall cost of buildings, networks, and the wider region and so were considered to be a good template for this project⁸.

Alongside decarbonising heating there is a need to improve the fabric efficiency of homes. This is required both to reduce bills, improve comfort and health and reduce the burden on the energy system. A range of targets are used for defining a target fabric efficiency level. This is usually defined in terms of the EPC score, which is a bills-based metric, or on heating demand, which is a measure of the heat energy a home requires per unit area per year.

We used a target of 90 kWh/m² heat demand, which follows the target used in the Government's Social Housing Decarbonisation Fund (SHDF).⁹ Previous work by *Parity Projects* has found that the vast majority of homes are able to reach this target. It sits reasonably near the median value for UK homes, meaning that roughly half of homes achieve better than this already, but the other half are worse.

It is worth noting that the form factor of a home has a large impact on heat demand (see box below for form factor explainer). Flats generally achieve low heat demand more easily than detached houses, as they benefit from party walls and ceilings, which don't lose heat.

Form Factor is a measure of building compactness, the ratio of surface area that can lose heat (the thermal envelope) to the floor area that needs to be heated. With the same heat demand target (e.g. 90 kWh/m²), a lower form factor home, such as a mid-floor flat, will require less insulation than a higher form factor home, such as a detached bungalow.

⁸ <https://gmgreencity.com/projects-and-campaigns/local-energy-market/>

⁹ [Social Housing Decarbonisation Fund Wave 2.1 Competition Guidance Notes](#), BEIS, July 2022

Following these two steps a third step was applied to install solar PV, wherever cost effective to do so.

4.3.1. Skills Assessment

The final output of this section is an estimate of the skills required to deliver each of the targets defined above. We have done this by estimating the number of trade days associated with installing each measure for a range of relevant professions. These are:

- General Labourer
- Insulation Specialist
- Gas Engineer
- Electrician
- Plasterer/Renderer
- Renewable Heat Specialist
- Retrofit Coordinator
- Window Fitter
- Carpenter

By summing up all the trade days required to deploy the installations we can get totals for each trade across the region. We can then estimate how many full-time equivalent tradespeople are required in each role and in total over the course of meeting each target.

4.4. EPC C by 2030

In this model we find the most cost-effective path to bring all homes up to EPC C through installing low carbon heating and fabric measures. It impacts only the 48% of homes, which aren't yet achieving EPC C.

Under this Scenario, by 2030 homes in the GSENGH area have a median EPC score of 72 and no homes score below EPC C. £23 B of investment is required into the 4.8 M homes affected with a median investment of £1,800 per home. A relatively small number of homes require much larger investment, which brings the mean investment up to £4,800. Under the current October price cap, the average bill savings for affected homes is £660 per year and the emissions reduction will be 9.7 M tonnes of CO₂ per year across the affected homes by 2030. Figure shows how the average cost in each home varies by EPC band. Unsurprisingly, the average investment for band D homes is far lower than the other bands, but as the majority of affected homes are in band D this contributes 72% of the total investment.

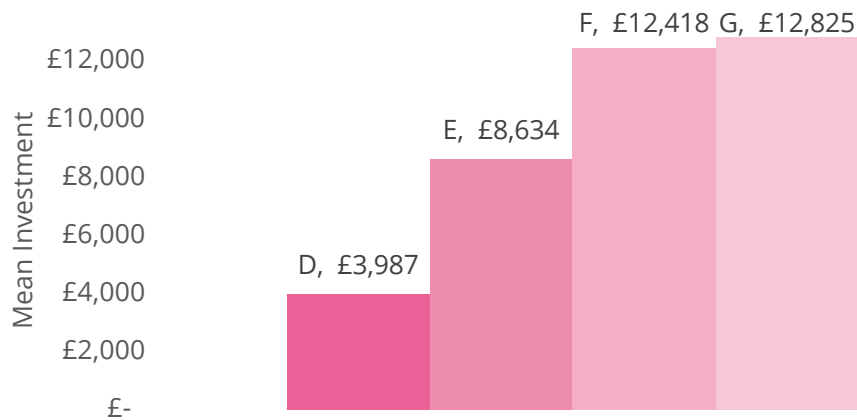


Figure 10: Mean cost per home by EPC band.

In terms of which measures are required, 88% of the total investment is used for wall insulation and heating systems, as shown in the main graph of Figure 11. Other measures are applied widely but are much lower cost such as replacing inefficient lighting and roof insulation, the inset graph shows that the number of measures is a significant proportion of the total for these.

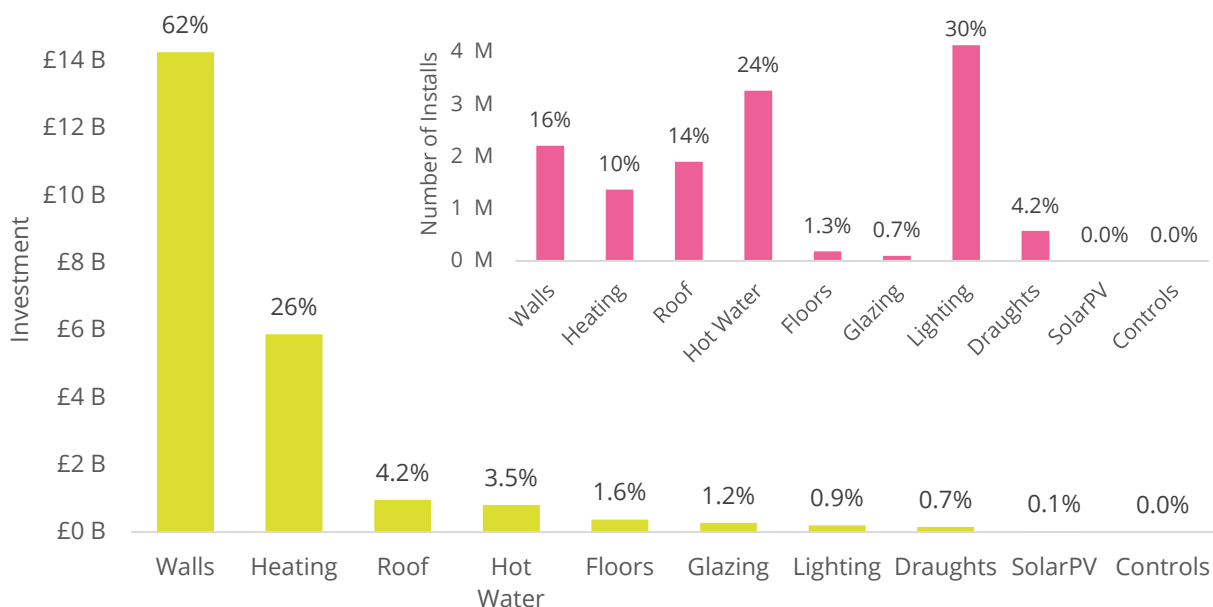


Figure 11: Investment and number of measures installed (inset) by measure type, under the EPC C Scenario. Data labels give the percentage of measures in that category by investment (main graph) and number of installs (inset).

Figure 12 shows the tradespeople required to deliver the EPC C target over the next 8 years. A total of 47,000 tradespeople are required across the region each year to install this work. This assumes that the scale of work is constant over this period.

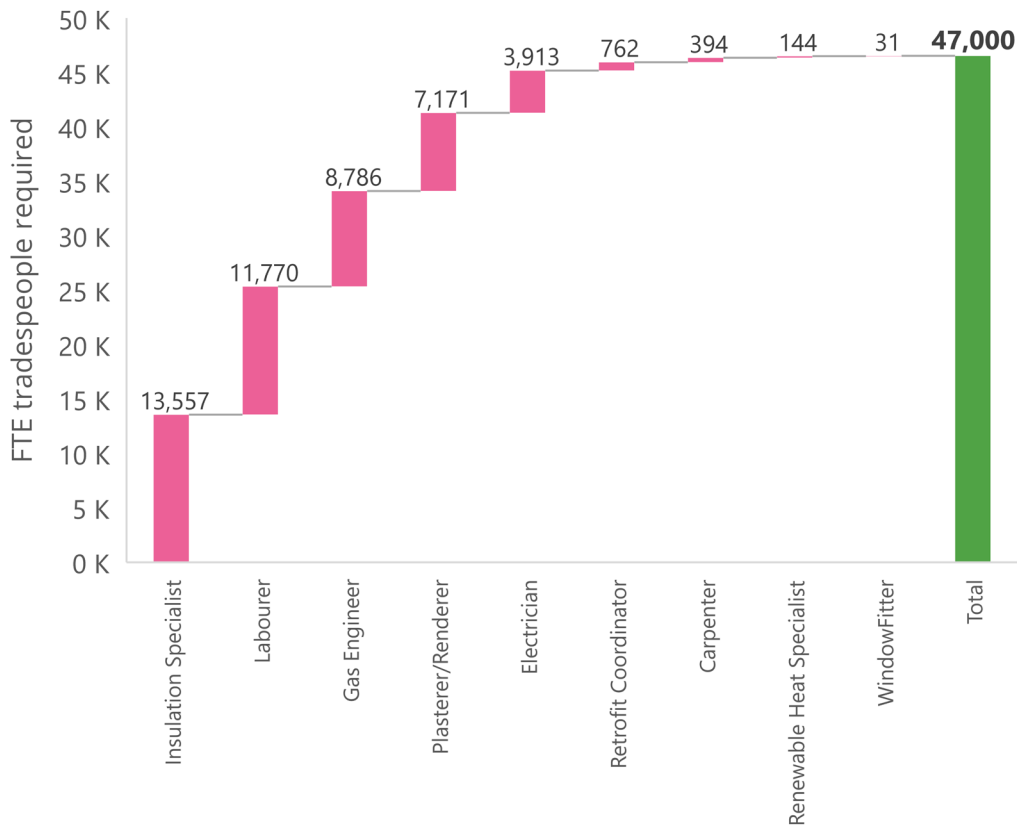


Figure 12: Graph of full-time equivalent tradespeople required to fulfil the EPC C Scenario.

4.5. Net Zero by 2050

For this model we find the most cost-effective path to Net Zero housing, as outlined above. The three steps to achieve this follow the EPC C interim target for low performing housing, such that the two targets work together effectively. The discussion in this section analyses all the work from now until 2050 as a whole, rather than assuming the work towards the 2050 target begins only when the EPC C target has been met in 2030. 99% of homes within the region are impacted by this Scenario, as almost all will require a heating system replacement, and most will benefit from fabric improvement.

Under this Scenario, the median CO₂ emissions of homes is 0.02 t per year, less than 1% of their current level. The exact level of emissions depends on the carbon intensity of the electricity grid,

we've used forecast values from BEIS for 2050.¹⁰ If we assume the grid intensity does not reduce from today then emissions are still 13% lower under this Scenario than today's baseline.

The median investment in each home is £13,000 and the total for all 10 million affected homes is £150 billion. The required investment varies less with EPC band than the EPC C Scenario, as shown in Figure. This is because almost all homes have a decarbonised heating system installed, which is a significant investment.

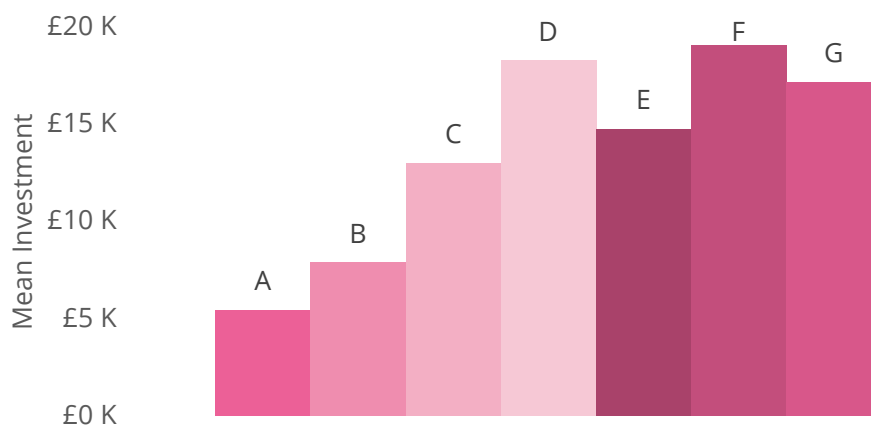


Figure 13: Mean investment to Net Zero for all homes, by EPC band.

Heating systems make up around half of the required investment, as shown in Figure 14. This reflects the requirement for all homes to have a decarbonised heating source. Solar PV makes up around a fifth of investment with £32 billion on 7 million installations. This is often a cost-effective way to lower bills and contribute to decarbonising the electricity network, but may not be so crucial to decarbonising housing, as ending the use of fossil fuel boilers, and improving insulation levels.

¹⁰ BEIS, [Green Book supplementary guidance](#), Oct 2021. Using the 'Grid average, Consumption-based, Domestic' factors

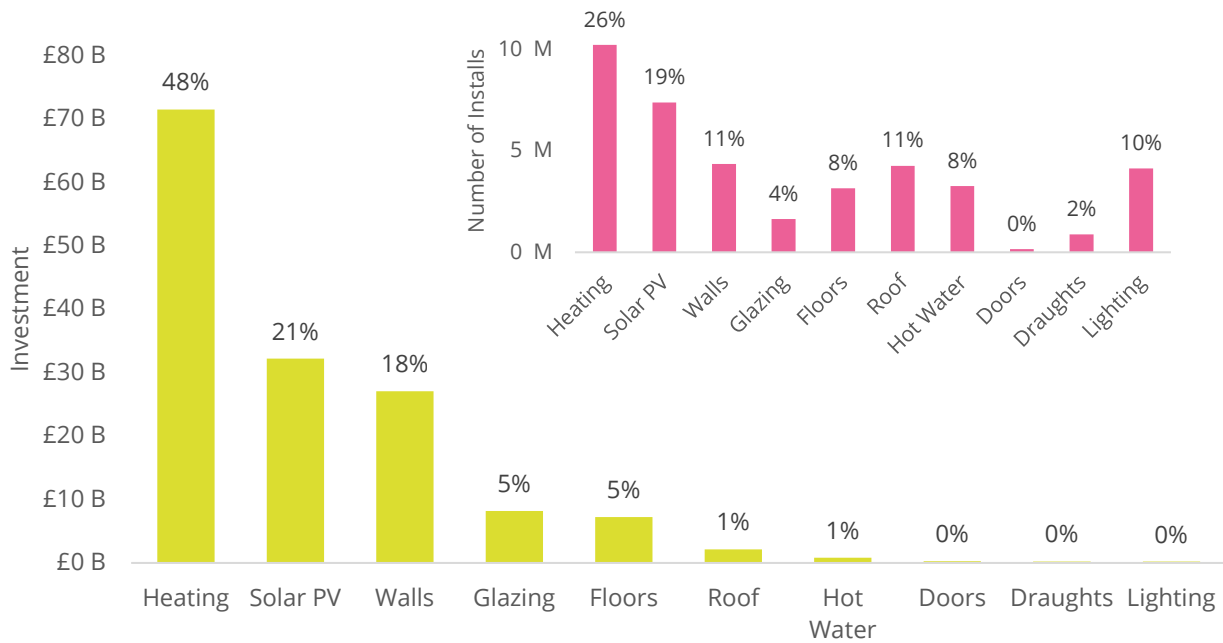


Figure 14: Investment and number of measures installed (inset) by measure type, under the Net Zero Scenario. Data labels give the percentage of measures in that category by investment (main graph) and number of installs (inset).

The tradespeople required for implementing the Net Zero Scenario over the next 28 years are shown in Figure 15. Surprisingly the annual requirement across all trades of **46,000** is very similar to the figure for the EPC C Scenario. This results from a higher volume of work but spread across the longer timespan to 2050. The distribution of trades within this varies, for example, more electricians are required due to the wider rollout of heat pumps and storage heaters. As before, these results assume a constant installation rate across the time period.

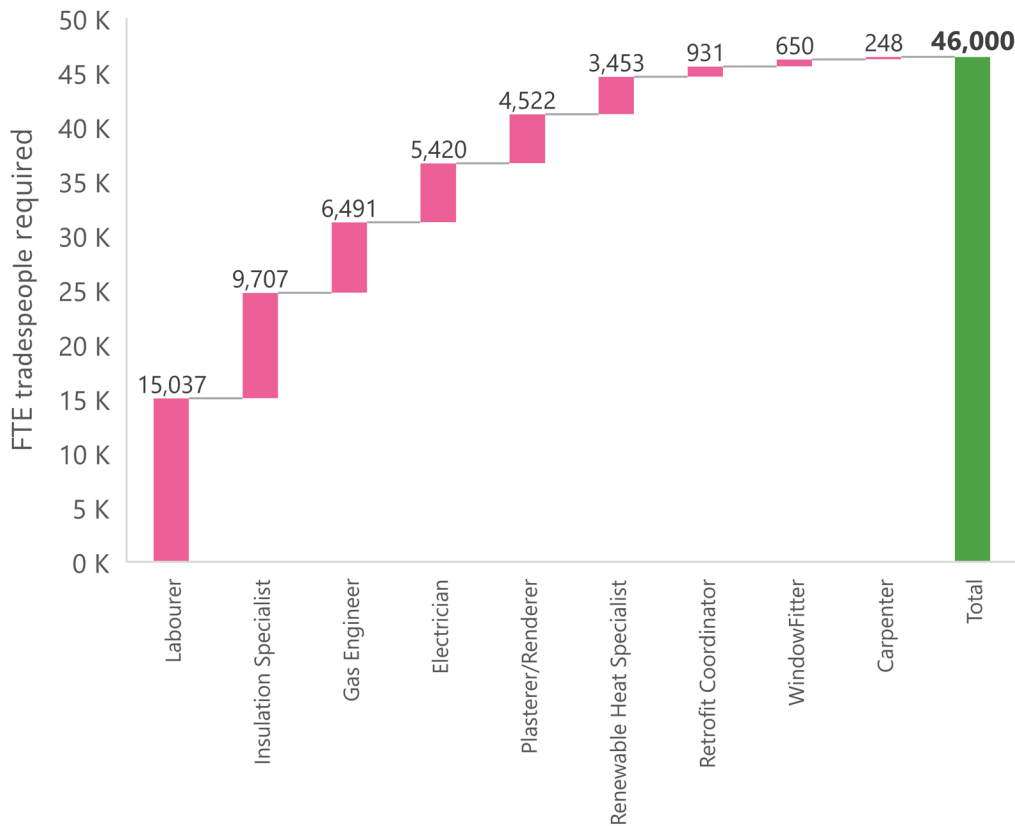


Figure 15: Graph of full-time equivalent tradespeople required to fulfil the Net Zero Scenario.

Using these baseline figures for the number of overall FTE roles required, we must then apply several important considerations when determining the number of training places this will translate to. Studies4 estimate that the skills needs will follow a bell curve with a peak in 2035 requiring about twice the estimated 46,500 workforce.

Additionally, most contractors do not work full time on the installation of new measures as there will also be servicing, repairs etc required. Applying further practical

employment considerations from reports¹¹ published recently, ESC estimate that the total required retrofit workforce in the Greater South-East region could rise to be circa **100,000 workers on average and 200,000 workers at the peak requirement periods.**

Changing work practices and the introduction of new technologies and digital tools make it difficult to translate these figures into an estimate of required training places. Also, a very large proportion of the workforce who will be upskilled will retire or change career before 2050, so it is likely that the **number of required training courses exceeds 500,000.**

¹¹ Construction Leadership Council, Greening Our Existing Homes - National retrofit strategy, 2021

The baseline figures from our modelling work are included in Annex 3 of this report which contains a full breakdown of all FTE tradespeople required by Local Authority area. It is important to apply the considerations listed above though when the information from our modelling is analysed. The data in Annex 3 contains information based on the headings as set out in the table below.

5. Policy and Funding Landscape

5.1. Policy

The Heat and Buildings Strategy sets out Government's overall vision for a clean heat transition and outlines a collection of current policy proposals and expected changes that will seek to decarbonise the UK's building stock at scale. Key interventions to support decarbonisation of heat in buildings include stimulating markets through innovation funding, tightening of building regulations, funding for a Boiler Upgrade Scheme (BUS) and Home Upgrade Grant (HUG), and the proposition of a new market-based mechanism (MBM) on fossil fuel heating manufacturers.

Acknowledging the need to drive a growing market for heat pumps, there is tangible risk that if applied poorly, these proposals may favour the pursuit of cost reduction and supply of a product, over the generation of genuine consumer demand. The current approach risks hampering innovation and competition by limiting the incentives for suppliers and manufacturers to innovate in other low carbon heating areas – implying a siloed approach to skills and training provision.

Currently, there is a big policy gap in building up markets for installers and supply chains to drive the home decarbonisation agenda. Skills and capacity requirements to fulfil expected future demand is not sufficient, and the framing of current policy arrangements encourage supply chains to deliver specific technology targets, rather than whole systems solutions. This then has a knock-on effect for the qualifications and training schemes required to install and deliver low carbon technologies at scale, limiting the pipeline for holistic courses which convey the complexity of energy systems, and how specific interventions fit within the whole heat decarbonisation picture. Without concerted efforts to change this approach the supply chain for the domestic retrofit sector will remain fragmented, delivering insufficient and poor-quality installations.

The heat challenge is broad and complex and will vary across local areas. Supply chains and skills provision have a strong regional and place-based element to them. For instance, what might work in the Greater South-East region may not work as well in the North-West. Similarly, intra-regional variations could dictate how local areas set about their own net zero strategies. Pathways to decarbonising will comprise a delivery mix of heat pumps, district heat networks and in some cases hydrogen for heating¹², as well as rollout of domestic retrofit. Greater emphasis on place-based programmes (perhaps evidenced through Local Area Energy Plans (LAEPs)) can evidence the need for low carbon technologies in local areas and therefore send appropriate signals to supply chains, educators and training providers on the most appropriate interventions needed within their areas.

Stronger government action is needed to support the market in scaling up training capacity and reskilling workers. A potential skills shortage could risk becoming a major barrier to implementing some of the policies in the Heat and Buildings Strategy if not addressed appropriately. Policy uncertainty stalls investment, which in combination with low consumer awareness and a lack of skills capacity inhibits low carbon technologies from being delivered. Without a sufficient pipeline

¹² <https://publications.parliament.uk/pa/cm5803/cmselect/cmsctech/99/report.html>

of investable projects, the skills requirements will continue to fall behind what is needed to meet the heat decarbonisation challenge.

In ESC's report *Achieving Heat and Buildings Decarbonisation by 2050 – A Framework for Local Government*¹³, in order to decarbonise heat there are 7 key needs which will need to be addressed to create successful partnerships which deliver value to both local and central government.

- Place Based Funding
- Demand Aggregation
- Collaboration
- Technical Coordination
- Skills
- Data
- Community Engagement

Without sufficient confidence in area-based plans, key stakeholders such as local supply chains and infrastructure providers cannot direct resources appropriately. Consequently, **skills in local labour markets** are not being developed to drive heat decarbonisation at scale.

Currently, the skills requirements for heat and building decarbonisation are lacking due to a combination of low demand signals and supply side profitability¹⁴. Without demonstrable returns on investment there is little incentive for those in the trade to build a low carbon workforce – subsequently the services and offers needed to achieve the multiplier effects for mass heat pump uptake are absent¹⁵.

We also need to consider the other reasons why only approximately 2,000 installers are accredited to work with heat pumps today compared to more than 30,000 that will be needed by 2028. There is lack of diversity in heat supply chains (see Section 6), which must be addressed to ensure they are representative of the communities they serve and also think towards the just transition linked to organised phase out of prevailing technologies.

Local authorities via Local Skills Improvement Plans (LSIPs) can signal investment needs for local areas, making use of existing funding sources such as education budgets to upskill its labour force with an emphasis on low carbon. An understanding of the appropriate skills and supply chains required for local areas will need to be informed by **data and evidence** from local areas.

¹³ Energy Systems Catapult, 2022. *Achieving Heat and Buildings Decarbonisation by 2050 – A Framework for Local Government*

¹⁴ Energy Rev 2021 - Exploring the financial conditions of the UK local energy business sector

¹⁵ Frontier Economics 2021 – Agent based modelling of heat market

Another major roadblock is continuing uncertainty about standards. Without minimum energy efficiency standards being confirmed by government, uncertainty about retrofit as a career path remains, and the property market will continue to undervalue energy efficiency.

5.2. Funding

Energy Systems Catapult's research into Building a Governance Framework for Coordinated Local Area Energy Planning¹⁶ suggests that local heating installers tend to operate on 2–3-year planning horizons and are often responding to short term, competitive Government grants or loans.

Historic short term grant funding has led to an over reliance on subsidies to drive markets which ultimately restricts innovation. The stop-start nature of this funding approach will not be enough to develop long-term markets that offer consistent demand required to develop and upskill the assessors, coordinators and installers required for net zero. Addressing this issue will require a much more nuanced approach to coordination, using robust evidence-based plans to inform the supply chain, matching workforce developments to local market needs.

One example of a recent funding scheme for retrofit training is the Home Decarbonisation Skills Training Competition. This scheme launched in September 2022 and is the follow-up to the Green Homes Grants Skills Training Competition. Funding is available to Further Education Colleges, Training Academies and Manufacturer Training Centres in England who can "provide appropriate training and support to installers operating across the different Department for Business, Energy and Industrial Strategy (BEIS) schemes"¹⁷.

The previous iteration of the scheme was launched in September 2020 and all training was originally scheduled to be delivered by 31st March 2021. However, successful training providers were only informed of the decision in December 2020 and this, in combination with the difficulties arising from COVID led to the scheme being extended until October 2021.

Training was expected to be offered for free or at least heavily subsidised, and within one of the following subject areas:

¹⁶ <https://es.catapult.org.uk/report/governance-framework-for-coordinated-local-area-energy-planning/>

¹⁷ <https://www.midlandsnetzerohub.co.uk/national-schemes/retrofit-training/>

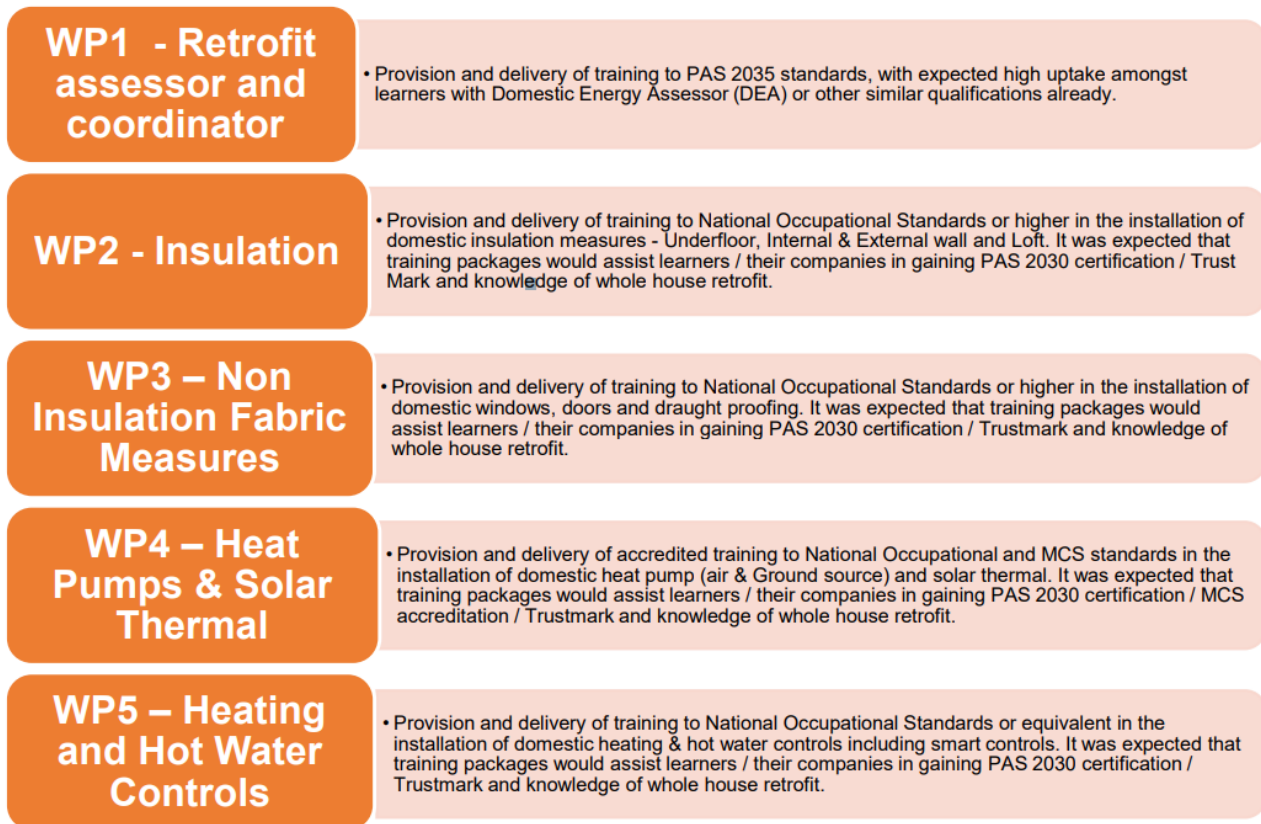


Figure 7: [Subject areas for training within the GHG Skills Competition](#)

It is notable here that none of the work packages includes the subject area of retrofit advice or customer care (crucial when we know that disruption is a big barrier to uptake), low-carbon heating design or system integration. There is also a lack of training covering post-install processes such as monitoring, evaluation, and system optimisation – aspects of the retrofit value chain that will help to increase consumer confidence to invest in retrofit measures.

Of the 18 organisations that were awarded funding, most were independent training providers with national coverage and only two were Further Education Colleges, and one of these formally **withdrew from the scheme as they were unable to recruit sufficient learners**. This is yet another example of the disparity between the expected demand and the actual demand being experienced by training providers.

6. A Diverse Workforce

Energy Systems Catapult has carried out research¹⁸ on the challenge of increasing diversity in the heating sector. Many of the issues, and opportunities, can be applied to the wider retrofit sector. The key findings are listed below:

- The heating sector is already experiencing a shortage of labour, which is likely to worsen as it consists of an ageing workforce with few new entrants. The latest Gas Safe Register data shows that engineers' median age is 55, an age around which many start retiring or leaving the sector¹⁹. In addition to the lack of workers, there is a large skills gap which needs to be addressed if Net Zero goals are to be met.
- At present, the vast majority of houses use gas boilers. The current workforce is largely unequipped to advise on and install low carbon heating, such as heat pumps, and energy efficiency measures, such as insulation and double glazing, to support the efficient and effective performance of those heating systems²⁰. Upskilling is required across the heating sector, to ensure people are equipped to advise on low carbon heating and to help integrate it into homes, for example designing and installing heat pump systems effectively, including sizing radiators and pipework to deliver low temperature heat.
- There are currently 120,000 gas boiler installers but to meet Net Zero targets the number of heat pump installers will likely need to rise from 2000 to around 50,000-100,000²¹. More skilled labour is already needed, as the industry is starting to experience rising consumer demand for low carbon heating installations as gas prices soar²².
- Urgent action is required to encourage more entrants to the workforce, considering the current labour shortages and the upcoming shift in the industry. The plumbing and heating industry consists of mainly white males, with only 2% of tradespeople being women²³. Moreover, only 5% of professionals in the overall UK energy sector have an ethnic minority background²⁴. To put this into context, in 2021, 21% of working age people did not identify as 'White British'²⁵. **Women and ethnic minorities represent an untapped talent pool that could help address the skills shortage.**

Cultural, social, functional and financial benefits can be gained through a more diverse workforce for both businesses and consumers. Organisations that lead the way in increasing their diversity have a chance to gain a competitive advantage.

¹⁸ Energy Systems Catapult, 2022. Increasing diversity in the heating sector to address the skills shortage and meet Net Zero

¹⁹ Gas Safe Register, 2017. The Decade Review: The UK gas industry considers its past, present and future.

²⁰ Energy Systems Catapult, 2021. Foresighting Skills For Net Zero Homes.

²¹ Energy Systems Catapult, 2021. Skills for Net Zero Homes Policy Brief: Towards an enduring policy framework to decarbonise buildings.

²² Woodfield, J., 2021. Demand for Heat Pumps has Surged by 28% in 2021, Research Shows. [online] Homebuilding & Renovating. Available at: <<https://www.homebuilding.co.uk/news/demand-for-heat-pumps-has-surged-by-28>> [Accessed 14 June 2022].

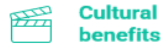
²³ Gocompare, 2021. The tradeswoman report: the changing face of trade. [online] Gocompare. Available at: <https://www.gocompare.com/van-insurance/women-in-trade-report/> [Accessed 23 September 2022]

²⁴ Norris, R., 2020. Offshore wind industry announces targets to employ 3,000 apprentices and a more diverse workforce. [online] Renewable UK. Available at: <<https://www.renewableuk.com/news/491745/Offshore-wind-industry-announces-targets-to-employ-3000-apprentices-and-a-more-diverse-workforce.htm>> [Accessed 13 June 2022]

²⁵ Office for National Statistics, 2022. Employment. Available at: <<https://www.ethnicity-facts-figures.service.gov.uk/work-pay-and-benefits/employment/employment/latest>> [Accessed 07 November 2022]

Businesses

Consumers



Cultural benefits

- Diverse and more nuanced collective knowledge and understanding
- Environments accommodating a wide spectrum of backgrounds, beliefs, attitudes etc.

- Better understanding of the best solution
- Understanding of customer's life, routines, household structures etc



Social benefits

- Improve mental health of employees
- Relatability with co-workers
- Sense of belonging

- Empathy: Emotional sense of relatability and belonging
- Sense of trust
- Increased confidence
- Transparent communication



Functional benefits

- Diversity of capabilities and skills
- Diversity of thoughts and opinions
- Boost innovation and solutions
- Boost employee productivity and performance

- Sense of efficiency
- Sense of process transparency
- Proactive advice
- Increased customer satisfaction of a job well-done



Financial benefits

- Increased revenue and profit
- Reduced employee churn (cost efficiency)

The most diverse companies are now more likely than ever to outperform less diverse peers on profitability. (McKinsey, 2020)

The table below highlights areas that various stakeholders could explore next to seize the opportunities in the sector.

	Employers	Industry bodies	Training bodies	Political bodies
Awareness <i>Awareness of career options and societal myths and stereotypes</i>	<ul style="list-style-type: none"> - Raising awareness of career opportunities through in- and out-of-industry engagement and advertising. - Making recruitment content more inclusive and accessible. 		<ul style="list-style-type: none"> - Highlighting a clear career pathway for different entrants. 	<ul style="list-style-type: none"> - Communicating benefits of a more diverse workforce.
Opportunities <i>More and fairer job and apprentice opportunities within the heating sector</i>	<ul style="list-style-type: none"> - Improving access to opportunities for ethnic minority and female apprentices. 	<ul style="list-style-type: none"> - Enabling consumers to find tradespeople that match their needs (e.g. language skills, flexibility). 	<ul style="list-style-type: none"> - Designing training and apprenticeships to suit trainees needs and prior experience. 	<ul style="list-style-type: none"> - Incentivising organisations to build/recruit diverse workforces (e.g. certification).
Inclusivity <i>Inclusive spaces that cater to individual needs of ethnic minorities and women</i>	<ul style="list-style-type: none"> - Providing inclusive work environments and physical spaces. - Providing diversity and inclusivity training for the workforce. 		<ul style="list-style-type: none"> - Providing inclusive work environments and physical spaces. 	
Flexibility <i>Flexible work and training models to better suit ethnic minorities and women</i>	<ul style="list-style-type: none"> - Understanding value of flexible working patterns. - Increasing job satisfaction and retention. 			

<p>Belonging <i>A sense of belonging through communities, mentoring and support</i></p>	<p>- Creating a sense of belonging for new and existing employees.</p>	<p>- Creating and supporting spaces for knowledge exchange.</p>	<p>- Fostering a sense of belonging within the sector for trainees and self-employed.</p>	
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7. Future Skills

In June 2021 a report was commissioned by the Gatsby foundation, as part of a project undertaken by Energy Systems Catapult (ESC) to map existing skills provision, highlighting gaps and skills requirements for the future retrofit marketplace. Its purpose was to pull together learning from previous ESC innovation projects relating to both commercial and domestic retrofit, highlighting relevant themes and providing a steer towards addressing training and skills needs for future retrofit programmes.

The Phase 1 report summarised the findings of three pieces of research reviewing the current state of the retrofit sector.

Literature Review	Learning from ESC innovation programmes	Expert interviews
<ul style="list-style-type: none"> • Open source reports • Academic literature 	<ul style="list-style-type: none"> • Electrification of Heat • Smart Systems and Heat • Modern Energy Partners 	<ul style="list-style-type: none"> • Installers • Educators • Technologists

Through the research activities Energy Systems Catapult were able to capture the main challenges and barriers being faced by the retrofit sector.

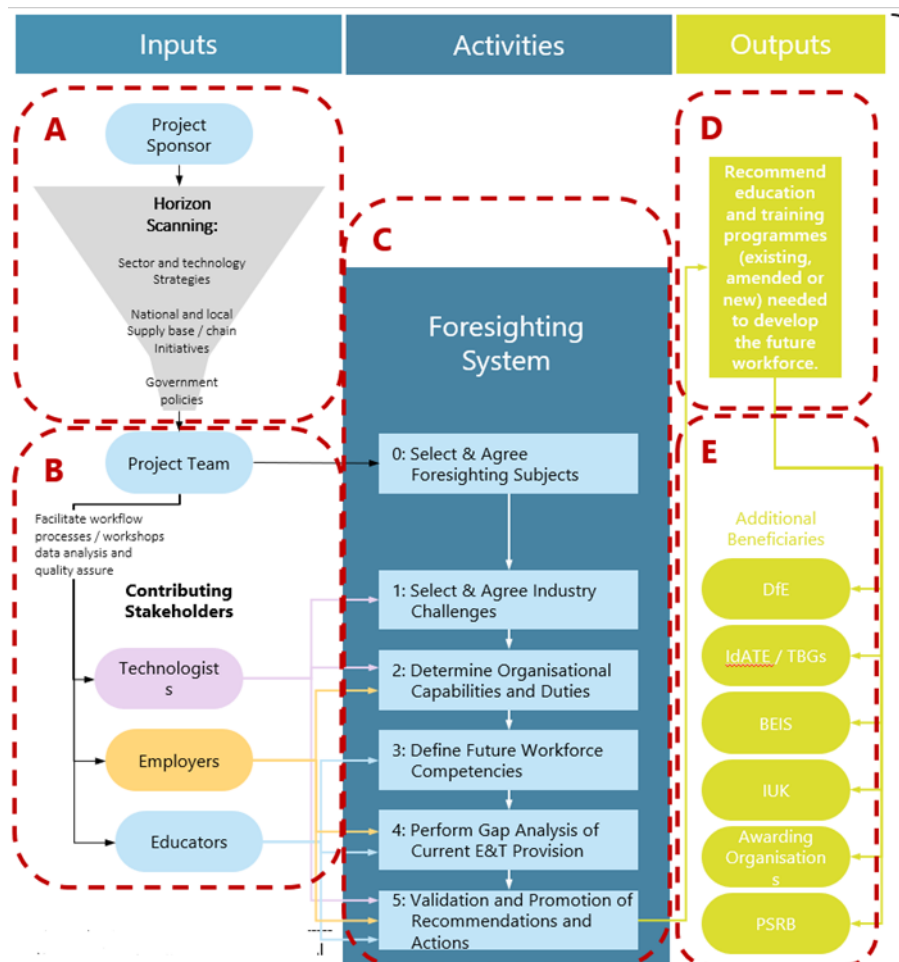
Consumer confidence and trust	Quality and governance	Systems integration
<p>Lack of:</p> <ul style="list-style-type: none"> • good quality information • customer care skills • good quality data • thorough property assessment <p>For customers:</p> <ul style="list-style-type: none"> • Lots to manage • Hard to differentiate quality • lack of trust = low demand 	<p>Certification and QA:</p> <ul style="list-style-type: none"> • Certification doesn't ensure quality • low quality undermines trust • Low demand means limited opportunities to improve <p>Training schemes:</p> <ul style="list-style-type: none"> • Focus on qualification rather than competency • Limited ongoing learning • Significant gaps 	<p>Lack of:</p> <ul style="list-style-type: none"> • Coordination across processes/roles • Knowledge sharing • Shared understanding <p>Value added by:</p> <ul style="list-style-type: none"> • Integration • Standardised processes • Whole house approach <p>...but currently perceived as an obstacle</p>

Several of the key barriers identified above relate to structural issues within the sector, but the research also identified 4 priority skills gaps:

- Property Assessment
- Advice and Customer Care
- Low Carbon Heating Installation
- Technology Integration

The insights gained from this first phase of work informed the choice of the Foresighting subjects in the subsequent project.

Following the HVMC process outlined below, the findings and challenges identified in the Phase 1 report were validated by the project sponsors in the workshops and the Foresighting subject was agreed as: **Retrofit of Low/Zero carbon solutions into domestic properties.**



Together with the project sponsors, Energy Systems Catapult were keen to ensure the organisational capabilities and competencies being captured in the Foresighting process would address the need for a more integrated retrofit process with an informed customer at its core, and so it was agreed that the Foresighting subject should be broad enough to include all aspects of the retrofit value chain.

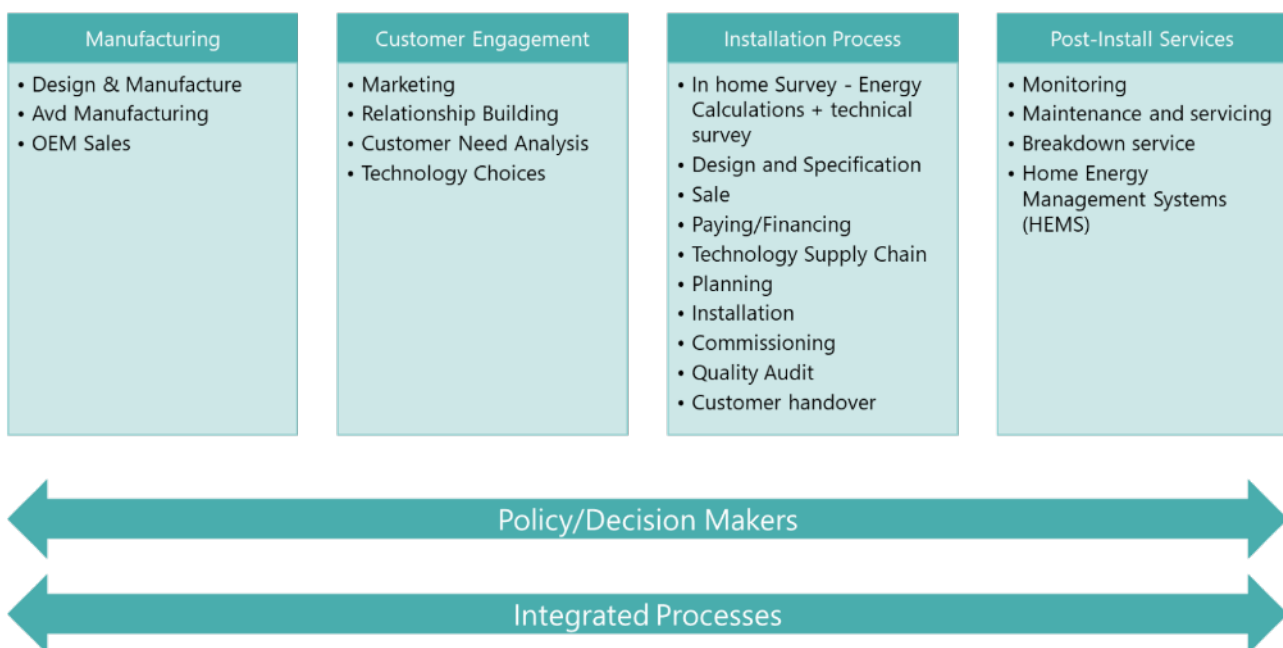
The first step of the Foresighting process utilised the expertise and insight of research undertaken by WMG to define the specific technological challenges. Using this information two online workshops were run with other technology experts from industry and academia, to determine the necessary organisational capabilities and the distribution of these capabilities across supply chains.

An employer group then identified the allocation of these capabilities across the workforce during two online workshops using three role groups to represent the workforce and four-point scale that differentiates the proficiency required by each role group. This approach allows the capability

required of a business, or organisation, to be broken down to the specific tasks, and then the knowledge, skills, and behaviours (KSB), required of the future workforce.

The resulting set of capabilities from this step were used by experts from education HE, FE and industry to generate related 'KSBs' for each role group. These future KSB competency sets were then mapped against existing competence statements, drawn from IFATE apprenticeship standards. This 'map and gap' activity verified which current skills and knowledge required for the future are covered by current standards and additionally identified 'gaps' in current provision, i.e., knowledge and skills required in the future that are not currently covered by current provision (as defined by standards). This insight can then be used to inform intervention and action to avoid future shortfalls.

Once the knowledge and skills statements had been identified within the Foresighting process and structure, it was important to identify where they were located within the retrofit value chain. This would allow us to visualise where key gaps existed within a framework that was familiar to stakeholders in the sector. The retrofit value chain has 6 main categories and is shown below. It illustrates how the skills and knowledge required both to create an integrated process and to inform policy/decision makers in their roles are relevant to all the steps in the value chain.



The competencies were allocated to three 'role groups' based broadly on education levels:

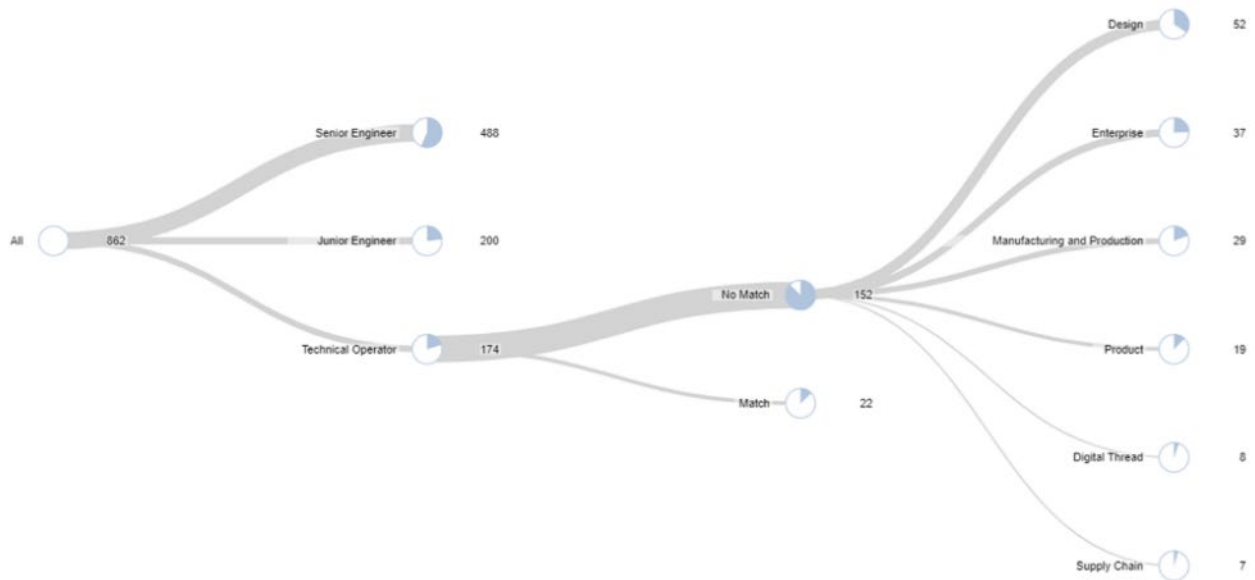
- Technical Operator – typically those with level 2/3 qualifications
- Junior Engineer - typically those with level 4/5 qualifications
- Senior Engineer - typically those with level 6/7 qualifications

The skills and knowledge statements within each role group were then allocated to the steps within the retrofit value chain.

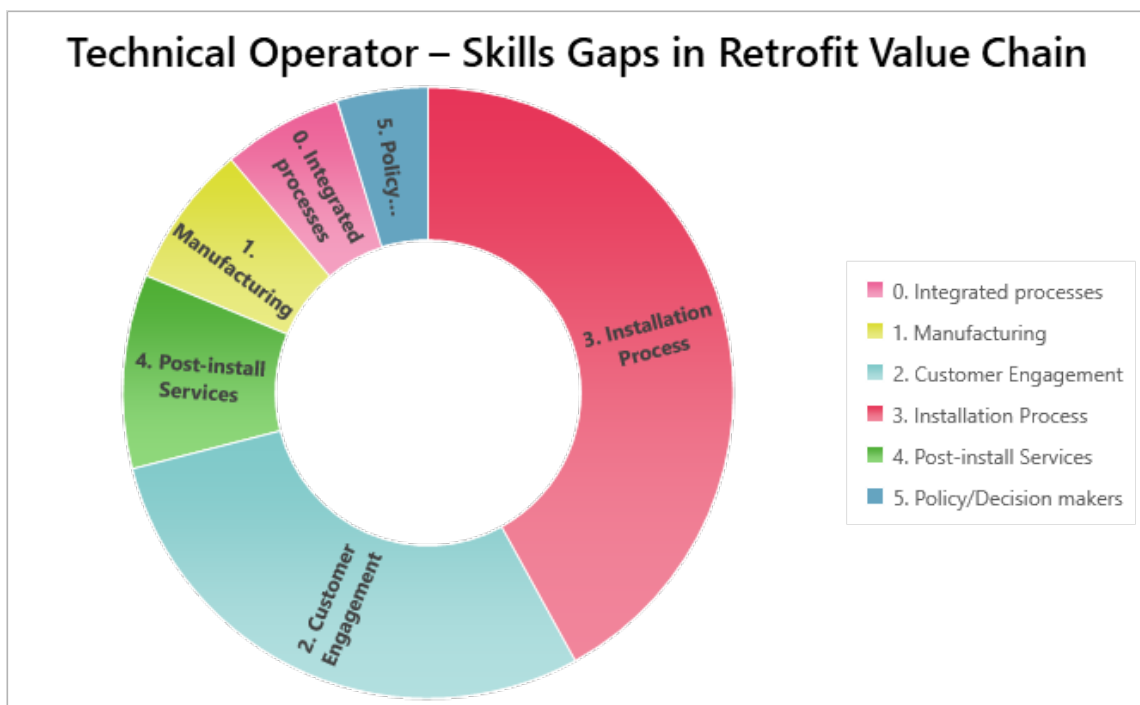
Within the Technical Operator role group there were 174 K&S statements in total, of which 22 were matched to existing IfATE standards and 152 were unmatched.

MATCH, NO MATCH TREE:

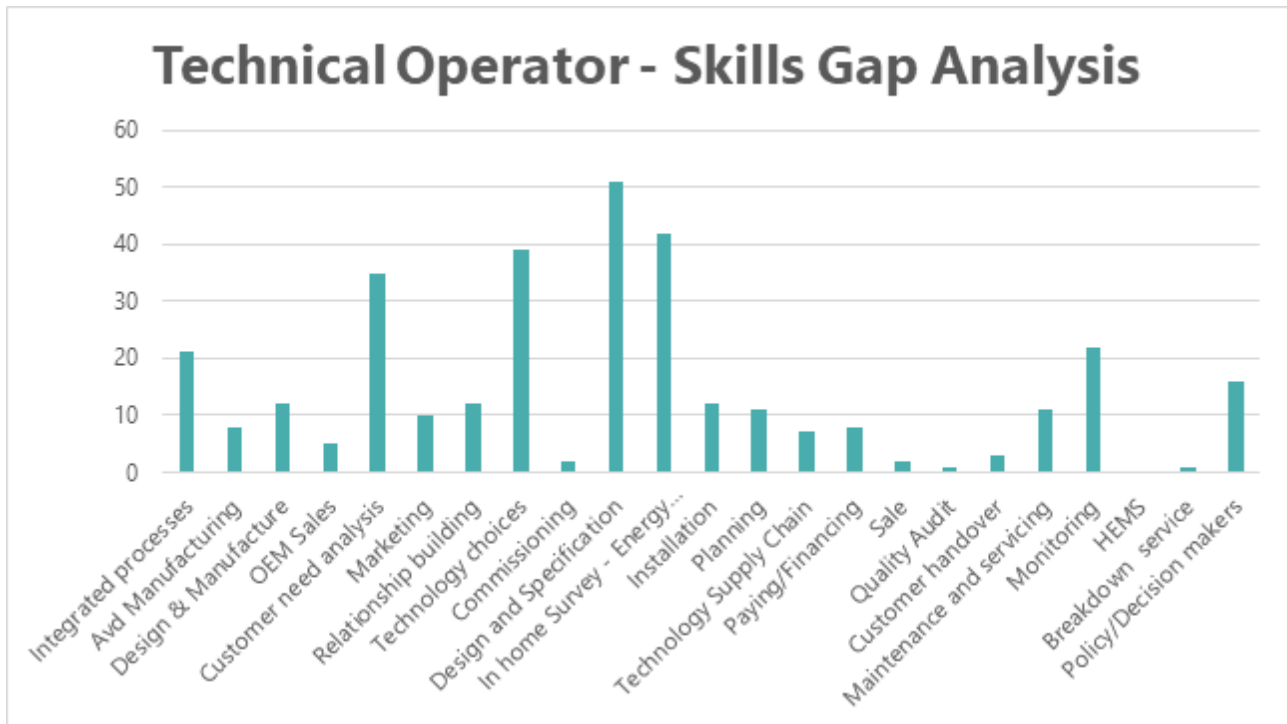
The number of FUTURE K&S statements specific to each Role Group, Business Function, Functional Requirement (Domain), Business Activity (Capability) and if match to CURRENT K&S statements.



When the K&S statements were allocated to the retrofit value chain steps they fell into the 6 main categories as shown below, with the majority located within the installation process, customer engagement and post-install services categories.



It was then possible to look at the specific steps within each of these categories to see where the foresighted skills and competencies were not already covered by the existing standards.



As can be seen in the table above, there were several key gaps identified in the retrofit value chain, most notably in the areas of:

- Design and Specification
- In-home survey – Energy calculations and technical survey
- Technology choices
- Customer need analysis

These areas all fall within the crucial customer engagement phase of the retrofit value chain. If consumers are not guided through these preliminary stages with easy-to-understand information, then there is a high probability that they will not proceed with the installation of measures.

For a client or homeowner to start the journey of home decarbonisation, information needs to be available, and advice given about the options available to them, the potential impact of those options and how appropriate they might be to their situation. This is a key part of raising awareness and motivating action. Part of the role may be satisfied through wider public campaigns and the availability of more generic information online, rather than the work of individuals, but and

it has also been recognised that energy advice is best delivered at a local level, due to each household having its own specific requirements²⁶.

In her report *Energising Advice*, Dr Catrin Maby goes on to state just how crucial **independent, unbiased** advice is to create the enabling conditions for the increase in retrofit and energy efficiency measures that are required over the next ten years. This unbiased advice is especially important, she argues, for the first stages of the retrofit journey, when the consumer will commonly have a relatively low knowledge base of the options available to them, and when it is essential that expectations are managed. Another key recommendation from the report is the need for a one-stop-shop solution for consumers, making the retrofit journey as straight-forward as possible (see figure 2). It will be impossible to meet our net zero targets without first gaining the confidence and trust of consumers.

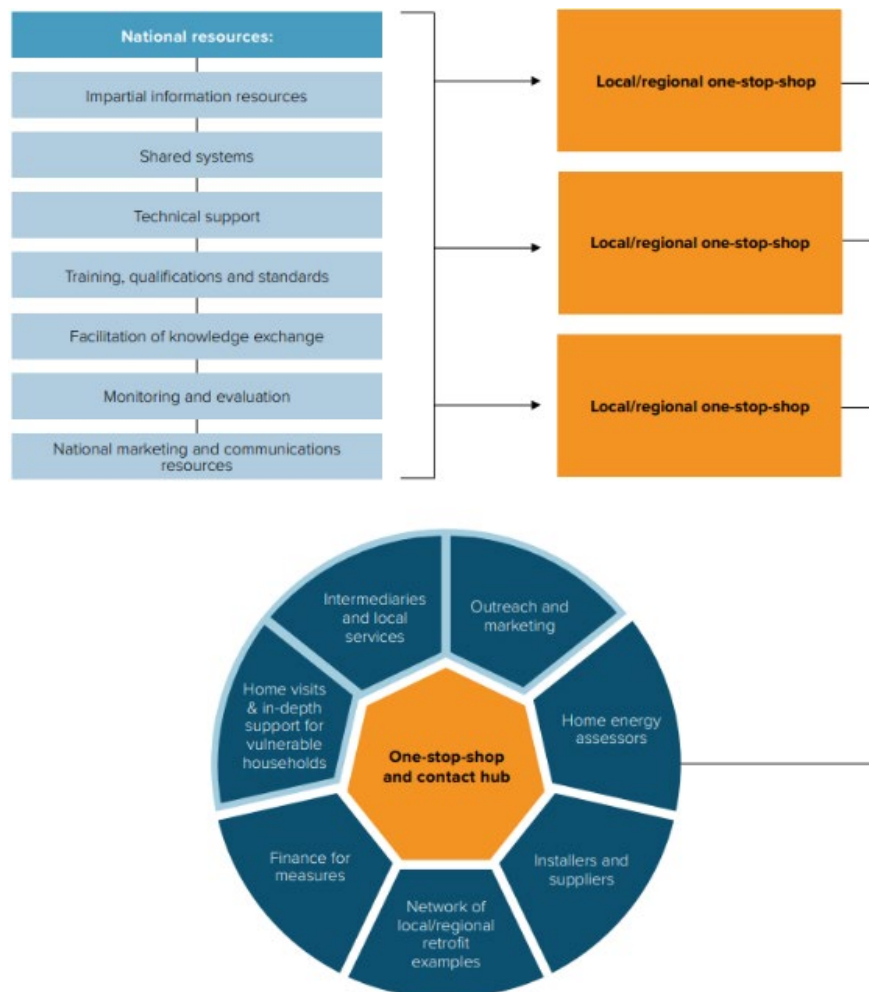


Figure 8: A national programme for energy information and advice²⁷

²⁶ MCS Charitable Foundation, *Energising Advice*, 2020

²⁷ MCS Charitable Foundation, *Energising Advice*, 2020

8. Training: Current Best Practice

Although there are significant training and curriculum gaps in the sector, and the wider sectoral issues around diversity and culture will take time to address, there are examples of good practice in the sector now that we can build on:

- PAS 2035 framework and focus on delivering quality
- Retrofit Coordinator training (Retrofit Academy working with industry to put PAS into practice)
- GSHPA standards and code of practice for ground source heat pump installation
- Microgeneration Certification Scheme (MCS) - role requirements and training for heat pump installers

GSENGH should aim to promote best practice and seek to align with other regional entities to create a national approach to training schemes.

8.1. Case Study 1: The Retrofit Academy

The Retrofit Academy is an example of a training provider that has recognised the need to create a well-integrated, high-quality retrofit process and has designed courses based on the PAS 2035:2019 framework.

The Retrofit Academy (TRA) and Essex County Council (ECC) have been working in partnership to deliver a major project, funded by the UK Government's Community Renewal Fund (CRF), to kick start the development of a retrofit supply chain in the county.

ECC recognised the opportunity that retrofit presents to the residents and businesses of the county as well as its importance to the achievement of Net Zero targets locally and nationally. The retrofit workforce in Essex was underdeveloped with very few businesses registered with Trustmark and the number of Retrofit Assessors and Retrofit Coordinators in single figures. ECC also recognised that the state of some of its housing stock is particularly poor and will urgently need retrofitting, notably in Harlow and Tendring.

Their commitment to supporting the development of a retrofit supply chain was demonstrated by their approach to TRA to work in partnership on a bid for CRF funding.

This resulted in an injection of £703,000 to deliver a range of retrofit skills and employability outcomes.

TRAs approach to retrofit skills development is far broader than simply providing training. In such an embryonic industry, TRA know that working closely with the organisations commissioning retrofit projects and the businesses providing the skills to undertake them, is critical. Their mission is to develop 200,000 competent retrofitters by 2030. They are doing this through forging close partnerships and a taking a system-wide, holistic approach.

The CRF project demonstrates this perfectly. It has been a success because both parties have had the space and support to focus on what it is they do best; ECC's understanding of their communities, residents and businesses has shaped the project approach and their hands-on local leadership has placed the project high-up on local stakeholders' agendas. TRA's in depth knowledge of domestic retrofit has provided the expertise and market knowledge to deliver meaningful project activities.

But it hasn't all been smooth sailing. Short project timescales, a low level of awareness of domestic retrofit and some difficulties with local engagement, have had to be overcome. The project has succeeded due to the ambitions and tenacity of both TRA and ECC along with the hands-on, can-do attitude shared by team members. This commitment to working together and an appreciation that retrofit skills development requires a system-wide, holistic approach rather than a "bums on seats" approach taken by other training providers has ultimately resulted in work that will leave a legacy in the county.

The project's outcomes show this to be true:

- Over 200 Essex residents have been trained in OFQUAL regulated PAS 2035 qualifications
- 20 businesses are being supported to gain the PAS 2030 accreditation needed to work on retrofit projects
- Research reports into the condition of housing stock and the status of the supply chain the county have been produced
- 10 Essex based housing associations have gone through an organisational development programme to help them become excellent retrofit clients
- ECC has agreed an ongoing Infrastructure Partnership with TRA to ensure that the foundations for a successful retrofit supply chain continue to be built, and
- ECC's Adult and Community Learning team have been established as the UK's first franchised domestic retrofit training provider, operating under licence from TRA to deliver training locally.

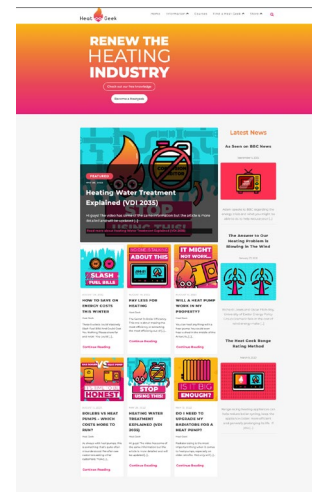
These final two outcomes safeguard the future of retrofit skills in Essex and mean that ECC and TRA will continue working together to this end. This continued partnership will ensure that a future stream of competent retrofitters is trained and able to meet the demand for domestic retrofit in the county in the future.

8.2. Case Study 2: Heat Geek

“Heat Geek was created to give expert advice on all aspects of the heating industry to both end users and industry professionals. There is an incredible amount of out-of-date information which has led to stagnation in standards”. The description on the Heat Geek website shows that the team there share many of the concerns and issues raised in this report. Through experience working in the sector, they identified skills gaps for low carbon heating technologies, deficiencies with existing training methods, and training standards that in their words “seemed to be more focused on sales points than install quality or techniques” and that “courses [were] based on attendance rather than gaining a skill level”.

So in response to these challenges Heat Geek was designed to provide:

- A solution that would revive the long-lost art of heating engineering
- Embrace technology, and to reignite a fuse in individuals love for the trade
- Exciting engineers on the huge opportunity and challenge this industry had ahead of it

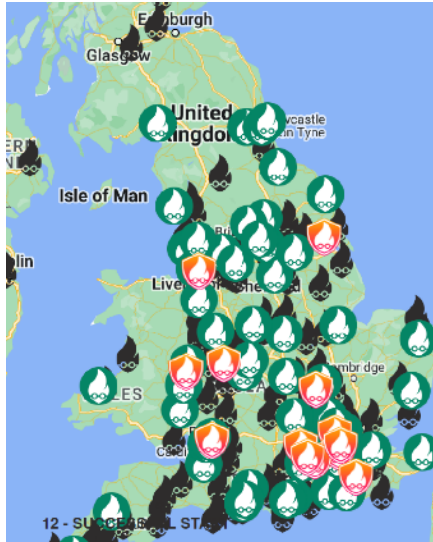


They created a digital platform with an online course to address the skills gaps in heating system design which was interactive with a fully integrated peer to peer learning support community. The idea was to provide resources that would enable engineers to continue their learning long after finishing the course.

Heat Geek aim to create a sense of “pride, achievement, self-worth, empowerment and feeling valued” and are starting to change the culture in the heating industry as a result. They believe that:

- Certification has to mean something
- Indicates a certain level of skill and competency had been reached
- Not just another piece of paper
- Balanced with access for all
- Information extremely digestible and accessible with lots of clear graphics
- Importantly, tests are very hard

- But coupled with unlimited peer to peer support the pass is simply persistence



CONNECTING PEOPLE

ENGINEERS & CUSTOMERS

751 TRAINEES WITH UNLIMITED CAPACITY



ENGINEERS & ENGINEERS



9. Barriers

Through our analysis of the research set out above and through interviews and workshops with representatives from the retrofit and educational sectors, we have identified barriers across three key areas that consider all the elements set out in Figure 2.

9.1. Curricula

- Qualifications and training courses exist for most of the main low-carbon technologies and roles, but as domestic retrofit is still in its infancy in terms of development and demand, many need updating and improving.
- Foresighting work has identified many knowledge and skills gaps in the customer engagement/care field that are not covered by existing IfATE standards.
- No training exists for retrofit evaluation, which is key to ensuring positive customer outcomes.
- There have been significant gaps in the curriculum that have only recently been filled. **Energy advice** being one for example, which up until the last 12 months, had been focused on fuel poverty (City & Guilds Level 3 Award in Energy Awareness), however The Retrofit Academy has recently introduced a Level 3 Certificate in Domestic Retrofit Advice.
- Reports²⁸ and industry experts we spoke to referred to the fact that it is very difficult to benchmark the **quality of training provision** that is on offer, with customer feedback being inconsistent and outcomes in terms of learning proving challenging to measure.
- Many members of the public will turn to their local general builder to deliver their fabric retrofit measures. There are only a very limited number of **'bolt-on' retrofit training courses** for general builders to access, and these are not mandatory.

9.2. Demand

- **Demand for training courses** from the industry depends on whether there is clear consumer demand for low carbon technologies. The current lack of clarity regarding policies and regulations related to low carbon technologies have a knock-on effect on demand for courses.
- Based on Net Zero targets there is a clear need for skills; however, the reality in the sector (when one looks at initiatives such as the Green Homes Grant Skills Competition), is that training providers still reported **difficulties in filling training places** that were offered either heavily subsidised or at no cost to participants.
- There is a **lack of diversity** in the current workforce. It is widely agreed that to enable retrofit at the scale and speed required to support Net Zero targets, the workforce will need

²⁸ <https://www.midlandsnetzerohub.co.uk/wp-content/uploads/2022/06/GHG-Skills-Competition-Evaluation-report-FINAL-003.pdf>

to change substantially in terms of size and skill. While both these factors need addressing directly, both would also widely benefit from building a more diverse workforce.

- There is a broader **shortage of people applying for low carbon roles**, as the UK job market is currently oversaturated with jobs. Potential candidates can find employment in the other sectors of the UK economy and often for a higher income.
- School leavers **do not see retrofit roles as 'green' jobs**.
- The **career pathways are often unclear** for low carbon roles: the various qualifications and different types of training courses can be very confusing for people who intend to pursue a career in the energy efficiency / low carbon technologies sector.

9.3. Tutors & Training facilities

- To meet the vast challenge of achieving the government's 2050 net zero target, there is clearly a need to **increase the training provision in all roles** throughout the retrofit process.
- A key challenge to meet the objectives is the **shortage of skilled tutors** and an urgent need to 'train the trainers'. Most trainers are professionals arriving from the industry and one of the challenges is the gap between the salaries in the education sector and the industry.
- FE colleges we spoke to as part of the project listed issues in recruitment and **upskilling existing tutors** as their most pressing challenge. Despite offering fully subsidised courses as part of the continuing professional development the uptake was minimal.
- FE colleges also reported that capital expenditure funding was available to them to create the facilities yet, the feedback during a workshop was that labs and other "**simulated environments**" were most often too far from real conditions to be able to effectively consider a whole building approach.
- Another issue that was highlighted through the workshop was that FE and HE colleges **do not employ a coordinated approach** with other local colleges for what courses or facilities should be provided.

10. Market Enablers

10.1. Digital tools and platforms

10.1.1. Retrofit planning for homeowners

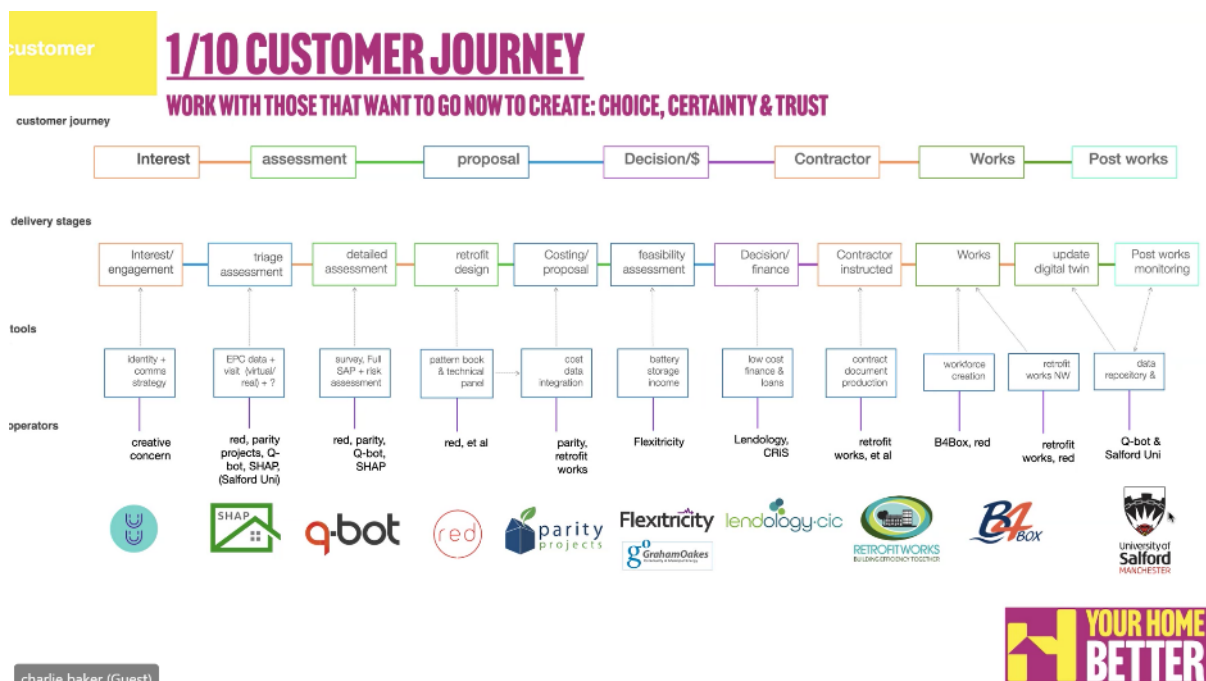
Parity Projects uses their **Retrofit Passport** software to ‘provide homeowners with a passport to a 21st century home, with a renovation roadmap and links to suppliers’.

There are three digital platforms currently in operation:

Your Home Better is a one-stop-shop for Greater Manchester setup to support households with what they need to make their homes more energy efficient and comfortable.

<https://yourhomebetter.co.uk/about-retrofit>

The “Your Home Better” product is being promoted across Greater Manchester to private households. It is aiming to support scaling of home fabric upgrade, low carbon heat, solar and storage.



Cosy Homes Oxfordshire is a one-stop home retrofit service, making it simple to make energy efficiency improvements to homes in Oxfordshire.

<https://cosyhomesoxfordshire.org/>

Ecofurb is the end-to-end home renovation service for Greater London. It helps homeowners plan energy efficiency improvements, give impartial advice, and oversee the works.

<https://www.ecofurb.com/>

The technology exists to help guide consumers through the process of retrofit, however as each property will need bespoke advice depending not just on archetype but also on the specific circumstances and requirements of the property dweller (financial, health etc), there is a need for retrofit advisors, assessors, designers and coordinators to work in tandem with the digital platforms. This is where funding is required because most consumers will not be in a position to be able to pay for the service themselves. If GSENZH can fund such services, then it would be an opportunity to insist on required standards of work / performance being met as well as a requirement to monitor the outcomes for consumers.

10.1.2. Property assessment

Accurate assessment of a property is essential to ensure that a new low-carbon heating system is designed and sized correctly. If heat-loss calculations are not carried out to a high standard then there is a risk that errors are made in the design stage of the retrofit process, leading to heating systems operating inefficiently and therefore with high running costs for the householder. ESC's innovation projects have shown significant shortcomings which include a lack of consistency, lack of accuracy, and very poor standards of data input.

Heat Engineer is a heat loss calculation software package designed to be easy-to-use for surveyors and retrofit assessors. The software creates 'extensive heating design reports' including

www.heat-engineer.com

Veritherm provide a Rapid Overnight Thermal Performance Test that will measure and verify heat loss in 12 hours or less. The tool is being used by a range of clients including: Developers, Self-builders, Housing Associations and Local Authorities, Architects, Homeowners and Energy consultants.

<https://veritherm.co.uk/>

There are examples of large differences between the outcomes of heat loss *calculations* and heat loss *measurements*, even when the calculations have been carried out by experienced and highly

qualified heating engineers. The accuracy of these outcomes can be the difference between consumers going ahead with heat-pump installs or not. Heat loss measurements such as those provided by Veritherm are much more accurate and we are seeing a trend which suggests that not as much work is required to the fabric of a building for a heat pump to operate efficiently as was previously assumed.

10.1.3. Evaluation

Developing standard methods to calculate performance using metered energy data has the potential to be an effective and affordable solution for measuring project outcomes, leading to greater customer confidence in low carbon technologies and enabling the development of new business models such as comfort-as-a-service or performance guarantee-based offers, to grow the market and aid the creation of new finance products to support this growth.

The Energy Systems Catapult, EP Consultancy, and the Active Building Centre have carried out a research and development project²⁹ to propose a 'metered savings' protocol for UK residential energy-saving retrofits. The project took several steps towards defining that standard methodology and further work is now being investigated to test the methodology in real-world situations.

Open Energy Monitor have developed a tool called the Open Energy Monitor. This system can be used as a simple home energy monitoring system for understanding energy consumption.

- View and explore real-time power and daily energy consumption in kWh.
- MyElectric is a web app which runs on Emoncms.
- MyElectric is also available as a native Android app

There is hardware required to run the monitoring system and in addition sensors need to be installed <https://docs.openenergymonitor.org/applications/home-energy.html>

The technology in this space is still being developed – at present it is relatively expensive and still not particularly user-friendly or intuitive - but progress is being made on this front and some installers, including SMEs, are starting to install monitoring equipment as standard with heat pump installs for example to provide those assurances on performance for the consumer. This is something that could be included in procurement by Greater South-East Net Zero Hub and other funding bodies.

²⁹ <https://es.catapult.org.uk/report/metered-energy-savings/>

10.1.4. Top level design / pathway to net-zero for local authorities

Parity Projects' **Pathways** and other suppliers offer whole area analysis that can identify need and opportunity across an area, from street-by-street analysis to broader studies like this one. Outputs can help communicate market opportunity to the supply chain, set expectations among homeowners, and focus spending of fuel poverty funding such as the Energy Company Obligation on those most in need.

From *Pathways*, Parity Projects can identify the archetypes that dominate the housing in specific areas and generate an example 'whole house plan' to help communicate what the installation of measures involves and what their likely cost and benefit is.

This data can be made available to every homeowner in an area through online advice services, as exemplified by London's Ecofurb and Cosy Home Oxfordshire, where the advice service is linked to the local supply chain. Alternatively, it can be used to generate standalone plans that empower the homeowner to better understand the specific options for their own home and to shop around.

Net Zero Go is a digital platform from Energy Systems Catapult that brings together all the tools and support that local authorities need to develop successful, locally focused zero carbon projects, taking initiatives from a standing start to operational and beyond.

With over 80% of councils in the UK now "declaring a climate emergency", Net Zero Go has been launched to tackle many of the common barriers to action, such as time and resource, financing and procurement, and local energy knowhow.

<https://es.catapult.org.uk/tools-and-labs/our-place-based-net-zero-toolkit/net-zero-go/>

Where local authorities are struggling to coordinate and plan their decarbonisation plans, GSENZH can play a role in raising awareness of these tools so that resources and budgets are used to best effect.

11. Dissemination Event

On the 30th of November ESC chaired an event held at the conference centre on Coin Street in central London to bring together stakeholders from the region and share the findings and recommendations of the project through the agenda items below:

Start	What?	Who?
10:30	Welcome & Introduction	GSENZH
10:40	Summary of Key findings	Rob Hargraves (ESC)
11:00	Keynote 1: Training provider	Retrofit Academy
11:20	Forecasting Need	Peter Griffin (Parity Projects)
11:35	Keynote 2: Training provider	Heat Geek
11:50	BREAK	
12:10	The Policy Landscape	Rob Hargraves (ESC)
12:30	Keynote 3: The Local Authority perspective	Surrey County Council
12:50	A diverse workforce	Danica Caiger-Smith (ESC)
13:05	What next?	Tim German (ESC)
13:25	Summary & Close	GSENZH
13:30	NETWORKING LUNCH	

We were very pleased to welcome three fantastic keynote speakers to the event in The Retrofit Academy, Heat Geek and Surrey County Council, who were able to provide their perspectives on the barriers and opportunities facing them in the sector.



35 delegates attended the event and represented the 24 organisations listed below:

HEAT GEEK
DEPARTMENT FOR BUSINESS, ENERGY AND INDUSTRIAL STRATEGY
GREATER LONDON AUTHORITY
SURREY COUNTY COUNCIL
ENERGY SYSTEMS CATAPULT
GATSBY CHARITABLE FOUNDATION
THE RETROFIT ACADEMY CIC
GREATER SOUTH-EAST NET ZERO HUB
HERTFORDSHIRE LEP
HAMPSHIRE COUNTY COUNCIL (SKILLS & PARTICIPATION)
IFATE
HAMPSHIRE COUNTY COUNCIL
WEST MIDLANDS COMBINED AUTHORITY
CONSTRUCTION INDUSTRY TRAINING BOARD
GREENWORKX
SURREY COUNTY COUCIL
SOUTH-EAST MIDLANDS LOCAL ENTERPRISE PARTNERSHIP
PARITY PROJECTS
OXLEP
WEST HERTS COLLEGE GROUP
NEW ANGLIA LEP

LONDON COUNCIL
INSTITUTE FOR APPRENTICESHIPS AND TECHNICAL EDUCATION
MIDLANDS NET ZERO HUB

In addition to the Q & A sessions at the end of each presentation, delegates had the chance to network during the break and lunch and were also asked to provide their thoughts on some of the key challenges facing their organisations. We asked 3 key questions:

- What are the top 3 things your organisation needs to help deliver high quality training?
- Which organisations do you need to partner with?
- What is the first step?

In response to the first question delegates mentioned the need for an “integrated skills system”, better communication between actors in the sector, and “more information about available training”. There was certainly a theme of creating more awareness, not just in consumers but also for organisations within the sector so that more informed decisions could be made. We hope this report will be a good first step towards that goal.

FE colleges identified the need for more collaboration within their sector, but also noted that links with independent training providers would be beneficial in terms of sharing best practice. The issue of identifying, attracting, and keeping high quality lecturers and trainers was also mentioned. This of course is in part a question of funding, but an independent training provider also highlighted the need to fund course and curriculum development, not just delivery.

When discussing the first step to achieve these goals, the key words of “communication”, “working with others”, a “joined up approach” and “coordination” demonstrate the need for a collective approach to solve the issues within the retrofit skills landscape, and the importance of the role that can be played by the Net Zero Hubs in coordinating those efforts.

The full responses of the delegates to these questions are included in Annex 4.

12. Recommended Next Steps

It is critical that all elements in the retrofit eco-system, including the market enablers we set out above are addressed. It is on this basis we provide the following recommendations.

12.1. Curricula

- Build consensus to **create a coordinated national approach to training**, focused on better integration and customer outcomes (to include regional net-zero hubs, combined authorities (CAs), LEPs, BEIS, DfE, IfATE, Accreditation Bodies).
- The many stakeholders will need to be coordinated & facilitated at both local (colleges, small businesses, LAs, CAs, LEPs...) and national (Gov, other Net Zero Hubs, energy providers, etc.) level.
- Work with industry experts, employers and IfATE to:
 - **Update and improve standards** for “new occupations” such as retrofit assessors, advisors or designers, based on Foresighting activities, and learning from innovation projects on energy efficiency measures and heat pump installations.
 - Build **‘retrofit specific’ modules into existing general construction qualifications** and courses.
- Investigate opportunities for funding to develop a **“Skills Accelerator”** for:
 - development of learning material, using insights and data available from innovation projects.
 - creation of a free-to-access learning portal with clear resources to suit trainees’ needs and that can be accessed flexibly.
 - pilot courses (online, face to face or hybrid).
- Collaborate with DfE to **evolve the Skills Bootcamps** to include more time and budget for the development of the learning resource.
- **Raise quality of training schemes** through joined-up approach linking customer outcomes with training courses undertaken by workforce. Rigorous and accurate evaluation of retrofit measures will be required to enable this.

12.2. Demand

- Deliver **awareness campaigns** through social media, advertising, secondary schools etc to:
 - Emphasise retrofit’s ‘green’ credentials and highlight the environmental impact of retrofit.
 - Highlight a clear career pathway.
- **Build diversity:**
 - Communicate benefits of a more diverse workforce.
 - Incentivise organisations to build/recruit diverse workforces.

- Carry out more detailed modelling of local areas so that **Local Area Energy Plans** can be drawn up with clear routes to decarbonising homes.
- Roadmaps and plans help here, but **long-term commitment to funding of decarbonisation measures** by Government will be essential for a step-change.
- **Incentivise high levels of 'retrofit-specific' qualifications** through procurement process for decarbonisation schemes.

12.3. Tutors & Training facilities

- Develop relationships between industry experts, independent training providers and existing college educators to **encourage knowledge transfer of best practice**.
- Promote **alternative ways of teaching and learning** that could be rolled out:
 - Online.
 - Peer-to-peer support.
- **Coordinate advice to FE/HE colleges** on training facility and retrofit course needs.
- Instigate more **joined-up approach between colleges** to share best practice and avoid duplication.
- **Modernising of learning facilities** should be considered (also part of a Skills Accelerator), starting with a benchmark study identifying the best-in-class facilities in the UK, study of the Learning Factory concept and adaptation to the retrofit sector, **development (or upgrade) of a pilot facility used initially for training the trainers**. Here too a collaboration with other Net-Zero hubs would be beneficial.

13. Appendix

13.1. Contributors

Educators	Local Government	Local Enterprise Partnerships	Training Provider
London & South-East Education Group	Cambridge & Peterborough Combined Authority	Berkshire	Heat Geek
College of Haringey, Enfield and North-East London	West Midlands Combined Authority	Hertfordshire	Retrofit Academy
East Sussex College Group	Greater Manchester Combined Authority	Buckinghamshire	
University of Suffolk	Greater London Authority	Enterprise M3	
College of West Anglia	Surrey County Council	Oxfordshire	
IFATE		Coast2Capital	
Suffolk New College			
Basingstoke College of Technology			

14. Annex

14.1. Annex 1

GSENZH Training Qualifications



DeltaEE_GSEEH%20Qualifications.xlsx

14.2. Annex 2

GSENZH Training Providers' Database



DeltaEE_GSEEH%20Training%20Providers.xlsx

14.3. Annex 3

Job roles requirement per local authority area.



NZero_All.xlsx

The data in this table contains information based on the headings as set out in the table below.

Heading	Explanation
Count	Number of homes affected by the scenario, i.e. have at least one measure installed.
Mean Cost	Average (mean) cost of work for all affected homes.

Total Cost	Total cost of work under the Scenario for all affected homes.
Insulation Specialist Days Per Job	Days of work to install all the work set out in the scenario for Insulation Specialists
Plasterer Renderer Days Per Job	Days of work to install all the work set out in the scenario for plasterer/renderers
Carpenter Days Per Job	Days of work to install all the work set out in the scenario for carpenters
Electrician Days Per Job	Days of work to install all the work set out in the scenario for electricians
Gas Engineer Days Per Job	Days of work to install all the work set out in the scenario for gas engineers
Gen Builder Labourer Days Per Job	Days of work to install all the work set out in the scenario for general building labourers
Window Fitter Days Per Job	Days of work to install all the work set out in the scenario for window fitters
Renewable Heat Specialist Days Per Job	Days of work to install all the work set out in the scenario for renewable heat specialists
Retrofit Coordinator Days Per Job	Days of work to install all the work set out in the scenario for retrofit co-ordinators
Total Trade Days	Days of work to install all the work set out in the scenario for all trades people
Average Trade Days	Average (mean) number of work days by all trades per home. "Total Trade Days" divided by "Count"

14.4. Annex 4

Workshop contributions from the final dissemination event.



Dissemination%20Event%20Workshop%20C

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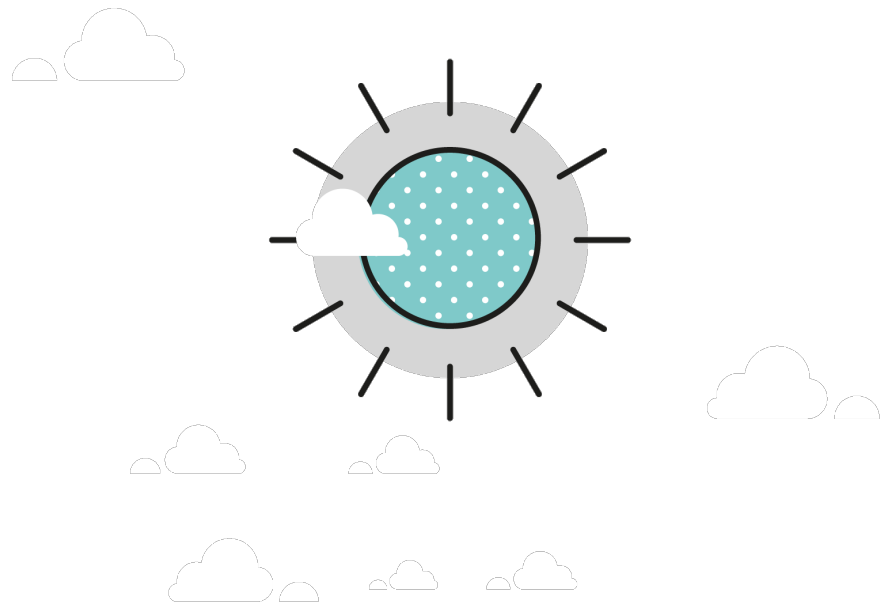
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Energy Systems Catapult

7th Floor, Cannon House
18 Priory Queensway
Birmingham
B4 6BS

es.catapult.org.uk
livinglab@es.catapult.org.uk

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