Department for Energy Security & Net Zero

Domestic Energy Efficiency Retrofit Supply Chain Technical Annex

DESNZ Report Number 079/2223

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Completed by Eunomia Research & Consulting Ltd for the Department for Energy Security and Net Zero prior to the recent general election in the United Kingdom in July 2024.

As such, any references to government policies, commitments, or initiatives may reflect the stance of the previous administration and were accurate at the time of fieldwork and writing.

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Acronyms and Initialisms

Acronym / Initialism	Full Wording
ATTMA	Air Tightness Trade Association
BEAMA	British Electrotechnical and Allied Manufacturers' Association
BEIS	Department for Business, Energy & Industrial Strategy
BEMS	Building Energy Management Systems
BCTA	Building Compliance Testers' Association
CD	Circular Design
DESNZ	Department for Energy Security & Net Zero
ECA	Electrical Contractors Association
ECO	Energy Company Obligation
EE	Energy Efficiency/Energy Efficient
EPC	Energy Performance Certificate
ESCO	Energy Service Company
FENSA	Fenestration Self-Assessment Scheme (Standard for Windows and Doors)
GGF	Glazing and Glass Federation
HEMS	Home Energy Management Systems
IRC	The Insulated Render and Cladding Association
LEB	Low Energy Buildings
LIA	Lighting Industry Association
MEES	Minimum Energy Efficiency Standard
NBD	National Business Database
NFRC	National Federation of Roofing Contractors
NIA	National Insulation Association

NZEB	Nearly Zero Energy Buildings
ONS	Office for National Statistics
PAS	Publicly Available Specification (e.g., PAS 2035)
PEB	Plus Energy Buildings
PRS	Private Rented Sector
RMI	Repairs, Maintenance, and Improvements
RIBA	Royal Institute of British Architects
RICS	Royal Institute of Chartered Surveyors
RQ	Research Question
SE	South East
SIC	Standard Industrial Classification Codes

Technical Annex

This technical annex presents the detailed methodologies associated with the Department for Energy Security and Net Zero (DESNZ) Research Paper titled 'Domestic Energy Efficiency Retrofit Supply Chain Final Report'.

Full List of Agreed Research Questions

Below are the agreed research questions (RQs) and their accompanying sub-questions which have been modified and expanded throughout the project process to accurately reflect the research.

1. What are the characteristics of businesses, installers, and key professionals involved in energy efficiency retrofit work?

1.1. Which energy efficiency measures do businesses currently install?

1.2. What professions are involved in energy efficiency retrofit in these businesses?

1.3. What is the current capacity, jobs, skills, and accreditation for the workforce?

2. What business models (including subcontracting) are used by businesses that deliver installation of domestic energy efficiency retrofit measures?

2.1. What factors influence changes to business models, with regard to changing capacity and capability for future domestic energy efficiency retrofit work?

2.1.1. How do business models differ for comparable businesses that don't deliver installation of domestic energy efficiency retrofit measures?

2 2. Who are the main customers for installation of domestic energy efficiency retrofit measures? For example, referrals, Department for Business, Energy & Industrial Strategy (BEIS) schemes, or new build or owner occupier markets.

2.2.1. How do businesses perceive demand for their services (now and in the future)?

2.3. How often is sub-contracting utilised? What is the sub-contract procurement process?

2.4. Are there differences in the types of businesses that work on different projects/markets? For example, owner-occupied housing, new builds, and social housing.

2.5. How do businesses respond to changes in demand? For example, new government schemes such as the social housing decarbonisation fund or regulations such as the private rented sector (PRS) minimum energy efficient standard (MEES) regulations.

2.6. What are the potential approaches, risks, opportunities, and business planning considerations for transitioning to doing more energy efficiency installations over time? Do these differ by size and type of project?

2.7. Which factors influence workers' decisions to join or not join the energy efficiency retrofit market, and what would incentivise involvement?

2.8. What are the different routes for an individual to enter the energy efficiency retrofit market?

2.8.1 How does this vary according to age, qualifications, and whether they are new to the jobs market?

2.8.2. How does this differ by trades, types of buildings to be retrofitted, subcontractor roles and other factors?

2.9. Which target groups of workers could be retrained in retrofitting whole homes?

2.9.1. Within each group of workers, what are their attitudes to switching to energy efficiency retrofit work?

2.9.2. What would make energy efficiency retrofit work more attractive to them?

2.10. Which of these groups are more realistically able or likely to want to be retrained?

3. What has been the role of government in business-related decisions in the retrofitting market?

3.1. What messages, if any, have businesses and installers heard from the government to encourage businesses and installers to drive towards net zero, by ensuring all homes are improved to reduce emissions towards our net zero targets?

3.1.1. How have these affected involvement in the market? Have any of these been about specific MEES, such as for the PRS?

3.2. What proportion of work is directly dependent on government schemes for retrofitting domestic homes? What schemes are these e.g., Social Housing Decarbonisation Fund, Home Upgrade Grant, Green Homes Grant, Energy Company Obligation (ECO)?

3.3. Other than business models, what are the barriers and enablers to expansion of capacity of the energy efficiency supply chains?

3.3.1. Are these barriers in relation to government or DESNZ retrofitting schemes?

4. What can we learn from stakeholders (including trade bodies, skills providers, net zero energy hubs, etc.) about the skilled roles and trades required to undertake different energy efficiency retrofit projects?

4.1. Do the skills needed differ depending on the type of project (for example, scale, age of building, domestic vs commercial retrofit)?

4.1.1. To what degree are these skills transferrable?

4.2. What are stakeholders' perceptions of the current supply of people to fill these roles?

4.3. What could be the impact (if any) of employment shortages for these roles on future expansion of the energy efficiency retrofit supply chain?

5. What skills and specialisms do installers and other energy efficiency retrofit professions have? How might these change in future?

5.1. What are installers' and others' current skills or qualifications?

5.1.1. What accreditation and qualifications do installers and other energy efficiency retrofit professions have? Does this differ by specialisms, types of firms worked with, or business models?

5.2. What factors influence willingness and suitability for upskilling individuals for energy efficiency retrofit work?

5.2.1. What is involved in this? For example, cost, affordability, time, content, etc.

5.2.2. How could we improve willingness and suitability for upskilling?

5.3. To what extent do installers and other key energy efficiency retrofit professionals specialise for different type of installations/buildings? For example, domestic retrofit vs commercial retrofit.

Overview of Energy Efficiency Measures in Scope

The measures below were selected by DESNZ as part of the study. Measures such as low carbon heating technology and smart meters were not covered in this research study as they were being picked up in other research that was carried out at the time of this study was being completed.

Primary Activity	Activity / Measure	Jobs / Other Considerations
Insulation	Loft/roof Flat roof Cavity wall Internal solid wall Underfloor External high rise External low-rise	Installers Construction businesses
Lighting	Energy-efficient lighting	Electricians Lighting consultants Installers Construction businesses
Airtightness	Draught-stripping	Surveyors Installers Construction businesses
Doors and windows	Replacement glazing and doors Secondary glazing Airtightness testing Draught-proofing Conservatory conversion	Installers Repairers Construction businesses
Energy management	Heating controls Home energy management system (HEMS) Building energy management system (BEMS) for multiple property developments/ retrofits	Installers Energy suppliers

Design and management	Retrofit design/coordination Building surveying	Project managers Architects Retrofit surveyors Retrofit assessors Retrofit designers Retrofit coordinators Principal contractors Engineers Energy specialists Energy Service Companies (ESCOs) – for multiple property developments/ retrofits

Detailed Methodologies

The method was split into two distinct phases:

Workstream 1 included a Rapid Evidence Assessment (literature review) of relevant primary and secondary literature. Specific questions were used to help focus the research and obtain relevant information for the RQs. It also comprised of a demographic analysis, which outlined who was in the supply chain and was used as a base for the primary research sampling.

Workstream 2 consisted of primary qualitative research. Interviews were carried out with stakeholders including installers, construction businesses and key professionals in the energy efficiency (EE) retrofit sector. There was also a small number of interviews with non-EE stakeholders and skills providers. Focus groups were conducted with trade bodies and industry experts.

The individual tasks have been mapped against the RQs in Table 1. A full list of RQs can be found in the Full List of Agreed Research Questions Section.

Table 1: High-level Research Question Mapping

Workstream	Task	Supply Chain Profiles	Business Models	Demand for EE Retrofit Business	Current Vs Future Skills	Incentivising towards EE Services	Role of Government
1	**Literature Review**	√	√		√	√	
1	**Demographic Analysis**	√					
2	**Stakeholder Interviews**		√	√	√	√	√
2	**Focus Groups**		√	√	√	√	√

Literature Review

Methodology

A literature review was utilised to assess the quantity and quality of the evidence surrounding EE retrofitting. The literature review reviewed a variety of published reports, policy papers and grey literature.

A range of search terms and phrases were developed based on the RQs and used to carry out 'string' searches online. A list of these is summarised below. Overall, 65 sources were identified that were relevant to the RQs and these are shown below. Sources for the literature review were found using Google and the Centre for Research into Energy Demand Solutions. The evidence was mapped against each RQ using an analysis tool.

Inclusion criteria were used for the sources and this consisted of whether the source was from the UK, if it was dated within the last 10 years and if the sectors in consideration were in scope. For example, insulation, doors and windows, EE lighting, design and management, air tightness and energy management. As part of reviewing the evidence, sources were also checked for whether they were peer reviewed, the source of funding and market coverage and this was taken into account when referring to the source.

The literature review aimed to build an evidence base against the RQs and inform early question design for the primary research. It informed the demographic analysis, interviews and focus groups.

Following the interviews and focus groups, a follow-up check was completed of any literature that was recommended by participants and had not been covered in the earlier literature review. This helped to ensure that any key insights from the secondary literature were not missed.

List of Search Terms

- UK domestic retrofit supply chain
- Retrofitting traditional buildings
- Energy efficiency retrofitting
- Domestic retrofit supply chain
- Residential heat decarbonisation research
- Barriers to domestic retrofit
- PAS 2035
- UK economic outlook
- Smart meter deployment research

A List of Literature Reviewed in the literature review

The findings from the literature review are encompassed in the research findings in the final report. A list of the literature reviewed is displayed below.

Literature Source	Link
Domestic Private Rented Property: Minimum Energy Efficiency Standard - Landlord Guidance	Link to document
Energy Company Obligation ECO	Link to document
Green Jobs Taskforce: Report to the Government, Industry and the Skills Sector	Link to document
Green Job Creation, Quality, and Skills: A Review of the Evidence on Low Carbon Energy	Link to document
TrustMark (a website containing data on registered members available through the Trustmark register of installers)	Link to website
Energy Efficiency and Low Carbon Market Research	Link to document
Country Report on the Energy Efficiency Services Market and Quality,	Link to document
Energy Service Market in the EU: Status Review and Recommendations	Link to document
Building on Our Strengths: A Market Transformation Approach to Energy Retrofit in UK Homes	Link to document
Office for National Statistics (a website containing data on the low carbon and renewable energy economy)	Link to website
Heat and Buildings Strategy	Link to document
Clean Growth Strategy: Leading the Way to a Low Carbon Future	Link to document
Small Firm Growth and the VAT Threshold: Evidence for the UK	Link to document
Building Skills for Net Zero; A Summary Report for the UK	Link to document
Non-domestic Energy Efficiency Optimisation and Retrofit Supply Chain Study	Link to document
Checkatrade (a website containing a database for registered tradespeople)	Link to website

UK Roadmap for Energy Efficient Buildings	Link to document
South West Retrofit Market Analysis Study	Link to document
Regional Supply Chain for Energy Efficiency Measures to Retrofit to Existing Housing	Link to document
Expert Views of Building Retrofit in the UK: Residential, Non-Residential and Heritage Building Renovations	Link to document
Options for Accelerating Retrofit Rates in the Domestic Owner Occupier Sector	Link to document
myBuilder (a website containing a database for registered tradespeople)	Link to website
Skills Needs Analysis - Repair, Maintenance, and Energy Efficiency Retrofit of Traditional Buildings	Link to document
PAS 2035/2019	Link to website
Each Home Counts: An Independent Review of Consumer Advice, Protection, Standards and Enforcement for Energy Efficiency and Renewable Energy	Link to document
Building a Market for Energy Efficiency: Call for Evidence	Link to document
Energy Innovation Needs Assessment: Building Fabric	Link to document
Energy Efficiency: Building Towards Net Zero	Link to document
Energy Efficiency's Offer for a Net Zero Compatible Stimulus and Recovery	Link to document
International Review of Domestic Retrofit Supply Chains	Link to document
Evaluation of Social Housing Decarbonisation Fund Demonstrator	Link to document
Evaluation of Green Homes Grant Schemes	Link to document
Evaluation of Sustainable Warmth Schemes	
Scotland’s Energy Efficiency Program	Link to document
Data on registered members available through the Trustmark register of installers	Link to Trustmark website
Construction Leadership Council National Retrofit Strategy	Link to document

Domestic Retrofit Supply Chain Initiatives and Business Innovations	Link to document
A Reform Agenda for UK Construction Education & Practice	Link to document
Local Green Jobs	Link to document
Retrofit Skills Market Analysis	Link to document
KMPG: Global Economic Outlook	Link to document
Transitioning to a Net Zero Energy System: Smart Systems and Flexibility Plan 2021	Link to document
Smart Meter Targets Framework Year 3 & Year 4	Link to document
Device Pilot: Smart Meters Ten Years into a Green Revolution	Link to document
Retrofit Skills Market Analysis	Link to document
Navigating Implementation Dilemmas in Technology-Forcing Policies	Link to document
Energy Efficiency of Housing, England and Wales, Country and Region	Link to dataset
Progress in Reducing Emissions: 2022 Report to Parliament	Link to document
From Retrofit to Regeneration	Link to document
Performance and Energy Efficiency of Traditional Buildings: Gap Analysis Update 2020 - Prepared for Historic England by Sustainable Traditional Buildings Alliance	Link to document
EPCs and the Whole House Approach - A scoping study	Link to document
Responsible Retrofit of Traditional Buildings	Link to document
Domestic Retrofit Market Intelligence & Skills Assessment	Link to document
Supply Chain Market Intelligence Executive Summary	Link to document
Understanding skills demand within domestic energy	Link to document
South West Net Zero Hub Retrofit Skills Support	Link to document
Breaking Barriers: An industry review of the barriers to Whole House Energy Efficiency Retrofit and the creation of an industry action plan	Link to document

Trading Up: A blueprint for collaboration to boost construction apprenticeships	Link to document
Demand: Net Zero - Tackling the barriers to increased homeowner demand for retrofit measures	Link to document
Scaling up retrofit 2050 - Why a nationwide programme to upgrade the existing housing stock is the only way for UK to achieve its carbon saving goals	Link to document
Underpinning the role of One-Stop Shops in the EU Renovation Wave - First Lessons Learned from the Turnkey Retrofit Replication	Link to document
Passivhaus Trust	Link to document
What Next for Heat & Building Policy?	Link to document
Eco Plus Supply Chain Market Research	Link to document
Designing an effective Home Upgrade Grant Scheme - Tackling fuel poverty and decarbonising homes	Link to document

Demographic Analysis

Methodology

The demographic analysis built on the literature review to develop an accurate demographic profile of the supply chain. It was also used as a base for the sample frame for interview and focus group recruitment. The business contacts from the demographic analysis were provided to project partner PFA Research to recruit for the interviews. The demographic analysis also informed the supply chain database, which contributed to an understanding of the supply chain in terms of the number of businesses working in the EE space.

Development of a Business Contacts Database

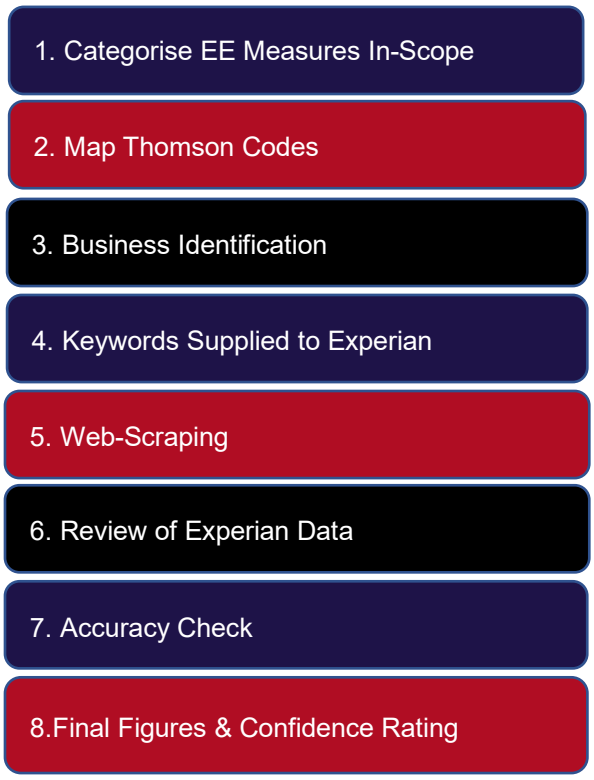
The development of the business contacts database was supported by Experian, a commercial data provider. Experian hold a National Business Database (NBD) of 97 per cent of UK businesses combining ten different sources including Yellow Pages, Thomson, and Companies House information.[1] The database has businesses classified by Thomson Codes and Standard Industrial Classification (SIC) codes. Thomson Codes, or Thomson Directory Classifications, are used to categorise businesses by industry type. Each company's classification code is determined according to economic sector, business sector, industry group, industry, and activity. Thomson Codes were used instead of SIC codes because Thomson Codes:

- tend to be more targeted towards specific business activities, so provide a more accurate picture of the industry;[2]
- are updated every six to twelve months, whereas SIC codes were last updated in the NBD in 2007, despite businesses being mandated to update annually within their annual return; and
- are telephone verified via the 118 Information Group.

An overview of the demographic analysis method is displayed in Figure 1 and described in more detail below.

[1] Experian (2008) 'Experian completes loading of 2007 SIC codes into National Business Database'. Available here.
[2] Eunomia Research & Consulting, for BEIS (2021) Non-domestic energy efficiency optimisation and retrofit supply chain study.

Figure 1: Overview of Demographic Analysis Method



1. Categorise EE Measures In-Scope

To carry out the demographic analysis, in-scope EE measures were first confirmed. A list of these EE measures can be seen in Section 2.

2. Map Thomson Codes

Following this, Thomson Codes were mapped against the EE measures identified to understand which codes were relevant to the EE retrofit sector. The most appropriate Thomson Codes were identified and a total of 123 were selected as relevant and shared with Experian. This ranged from codes such as ‘Code 15444: Air Tightness Testing’ to ‘Code 14610: Carbon Assessment’. A full list of the Thomson Codes identified can be viewed in ‘3.2.3 Short-Listed Thomson Codes.’

3. Business Identification

Experian used the Thomson Codes provided to collate a list of businesses against each of the codes, resulting in a Total Business Count. They identified a possible Total Count of 123,390 businesses, as shown in Experian Total Business Count. This represented relevant businesses identified under the Thomson Codes and therefore potentially involved in EE retrofit. It is unlikely that every single business identified in this count was active in the EE retrofit supply chain and some businesses may have been missed if operating under different Thomson Codes. When the dataset was received this number was 124,452, suggesting data was not

available for some of the original entries. This means these businesses may no longer be operating or further information wasn't available on them.

4. Keywords Supplied to Experian

A list of key words specific to the project were provided to Experian and are shown in Keywords for Web-Harvesting..

5. Web-Scraping

A web harvesting method (searching website home pages for relevant keywords) was required to refine the Total Business Counts down to a Screened Count. To reinforce the web harvesting, a principal activity search was also undertaken. This method is used by Experian alongside web harvesting and searches a free text field in Companies House data for the key words. This exercise resulted in a Screened Count of 4,497 businesses. The Screened Count combined the results of the different searches and should more closely represent a sample of businesses engaged in EE retrofits, acting as the Thomson Code Sample used in the analysis of turnover and number of employee analysis.

6. Review of Experian Data

Following receipt of the Screened Count from the web scraping, Eunomia reviewed a sample of the businesses. A sample of each data category was analysed to see how many relevant businesses there were, and this identified proportion was then applied to the entire category. This aimed to establish approximately how many relevant businesses there were in each category. A list of the categories can be seen in Experian Total Business Count. This process aimed to obtain an overview of how many businesses there are in the supply chain and the information together formed the supply chain database. This is a database which enabled understanding of the current EE supply chain and provided high-level insights into how the supply chain currently works. It was structured to organise data into key categories, including business details and jobs.

7. **Accuracy Check**

A sample of businesses in any Thomson Codes that hadn't been sampled at all were checked and the results recorded. The key outcome from this was the finding that 5 of 21 of these businesses (24 per cent) were relevant to the project scope. This check confirmed the suspicion that some businesses were excluded from the sample frame. No action was taken as this only affected a small number of businesses.

Checks were also done on whether existing example companies that are known to operate in this sector were shortlisted. This required checking a list of organisations that were known to operate in the domestic EE sector and verifying whether they were included in the Screened Business List. Some businesses appeared in the screened business list, however there were some missing. This highlights one of the limitations of this research method – it is likely that the Screened Business List screened-out some relevant businesses, as EE work may not be their main focus.

8. **Final Figures and Confidence Rating**

Following the accuracy checks a business count was devised for each sector from the business numbers identified in the Experian dataset. These counts were cross checked with Trustmark data, net zero energy hub data, SIC classification codes, Nomis official census figures and Office for National Statistics (ONS) data pm the non-financial business economy. This contributed to verify count data and identifying alternative counts that could be cross-referenced with what was found. The following trade associations were also contacted to support in validating the number of businesses identified:

- Royal Institute of British Architects (RIBA)
- Royal Institute of Chartered Surveyors (RICS)
- Federation of Master Builders
- Fenestration Self-Assessment Scheme, Standard for Windows and Doors (FENSA)
- Glazing and Glass Federation (GGF)
- Electrical Contractors Association (ECA)
- British Electrotechnical and Allied Manufacturers' Association (BEAMA)
- Lighting Industry Association (LIA)
- National Federation of Roofing Contractors (NFRC)
- National Insulation Association (NIA)
- The Insulated Render and Cladding Association (IRC)
- Air Tightness Trade Association (ATTMA) part of Building Compliance Testers' Association (BCTA)

The findings from the business count checks, secondary data check and trade associations were gathered in a table to understand the potential range of businesses carrying out each measure in the scoping list. A confidence rating was given to each business count based on the amount of data available to check against and whether it was validated by a trade association. These results have been discussed in more detail in ‘Data Analysis and Findings’.

Benchmarking Against Previous Studies

There are four studies that were deemed suitable for a benchmarking comparison. Three of these are regional studies of the EE and renewable energy market. One is a study on the non-domestic EE retrofit supply chain.

Eunomia carried out a study on behalf of DESNZ on the non-domestic retrofit supply chain in 2021.[3] This study used a similar method as this piece of research to examine the supply chain. RegenSW and Databuild studied the EE and renewable energy market in the South West region in 2014. They examined the size, number of businesses, turnover and number of employees in the retrofitting sector in the South West.[4] The University of Sheffield also carried out a study on the regional supply chain for EE measures to retrofit existing housing, focusing on the Yorkshire and Humberside region in 2010.[5] The Greater South East Net Zero Hub carried out a study on the domestic EE market in the hub area as a whole.[6] These studies have been discussed in Table 2.

[3] Eunomia Research & Consulting, for BEIS (2021) Non-domestic energy efficiency optimisation and retrofit supply chain study.
[4] Regen/Databuild (2014) South West Retrofit Market Analysis Study.
[5] Koh, S., Genovese, A., Rees, G. (2010) Regional supply chain for energy efficiency measures to retrofit to existing housing: Scoping study for the Yorkshire and Humberside Region.
[6] Greater South East Net Zero Hub (2022) Domestic Retrofit Market Intelligence & Skills Assessment.

Table 2: Discussion of relevant studies examining the retrofit supply chain

Study	Scope	Outcome	Similarity/ Difference	Limitations/ Reasoning
Eunomia, on behalf of BEIS (2021) 'Non-domestic energy efficiency optimisation and retrofit supply chain study'.	Non-domestic retrofit supply chain in the UK.	Upper limit of 96,150 businesses and a lower limit of 6,790. Concluded between 36,000 – 87,000 non-domestic retrofit businesses in the UK.	Focused on the non-domestic retrofit supply chain but found a significant amount of cross-over between domestic and non-domestic.	Figures can be used towards an indication of the size of the domestic supply chain. Used Thomson Codes and identified some similar limitations with the Experian data. Utilised verification methods to validate.
Regen and Databuild (2014) 'South West Retrofit Market Analysis Study'.	Non-domestic and domestic retrofit supply chain in the South West of England.	Estimated approximately 6,500 businesses involved in retrofit market in the South West.	Identified categories of businesses similar to those used in this study. Using GDP to scale up the number of businesses from regional to national level provided an estimated total count of ~76,000 relevant businesses in the UK in 2014.[7]	ONS statistics demonstrate the retrofit sector has grown considerably, so it would be expected that the business count would have increased.[8] Focused on the whole retrofit sector not specifically domestic, and it didn't use web harvesting to understand how accurate its population sample was. Used SIC codes with commercial database providers but also used Thomson Codes with Experian. Attempted to verify data with trade associations but were not successful.

[7] The SW region's GDP represented 9% of the total England GDP in 2014 when the study was completed. Eurostat news release 39/2016 (2016) GDP per capita in 276 EU regions. Available here.
[8] ONS (2023) Low carbon and renewable energy economy, UK: 2021.

Koh, Genovese, Rees (2010) 'Regional supply chain for EE measures to retrofit to existing housing: Scoping study for the Yorkshire and Humberside Region'.	Retrofit measures in existing housing in Yorkshire and Humber region. Included similar measures to this project but scope also covered heat pumps.	EE retrofit sector in Yorkshire and Humber equated to around 5,000 jobs.	Using GDP to scale up the number of businesses from regional to national provided an estimated total count of ~62,500 businesses in 2010.[9]	As above, this study is over ten years old and the retrofit sector has grown, so it can be expected that the business count would be higher now.
Greater South East Net Zero Hub (2022) 'Domestic Energy Efficiency Supply Chain Market Intelligence'	Domestic EE market in the Greater South East, including London boroughs. Study looks at EE, electricity and heat, making good after works and advisory and related services.	Number of companies in the EE supply chain in the South East in 2021/22 was 8,011. 62 per cent of these perform EE measures, making a total of 4967.	Included ventilation and heat recovery within EE measures.[10] Using GDP to scale up the number of businesses performing EE measures from regional to national provided an estimated total count of ~11,300 businesses.[11]	Used a KMatrix methodology which tracks technology and market changes using 'big data' to provide evidence about how companies adapt to and perform within changing market conditions. The measures studied are more specific than the other studies so re-proportioning the number of businesses gives a lower number overall.

[9] GDP as a proportion of England in the Yorkshire and Humber region in 2010/2011 is estimated to be 8%, based on stats from: European Commission (2014) Regional GDP per capita in the EU in 2011: seven capital regions among the ten most prosperous. Available here.
[10] EE Measures include energy management, energy saving lighting and ventilation and air tightness which includes insulation and windows/doors.
[11] GDP as a proportion of England in London and the South East region in 2021 is estimated to be 44%, based on stats from Statista (2021) Gross domestic product of the United Kingdom in 2021, by region. Available here.

Short-Listed Thomson Codes

Thomson Class Code	Description	Relevance
15444	Air Tightness Testing	Airtightness
04420	Architects	Specialists in housing developments and large projects
04422	Architectural Services	Retrofit specialists
04424	Architectural Technologists	Specialists in housing developments
04440	Architectural Woodwork	Retrofit specialists
75312	Basement & Cellar Conversions	Retrofit specialists
95014	Bathroom Installation & Supply	Design
10790	Bricklaying	Construction and retrofit
11040	Builders	Installers
65428	Building & Extension Plans	Retrofit specialists
11280	Building Consultants	Retrofit specialists
11371	Building Refurbishment & Restoration Contractors	Retrofit specialists
11400	Building Services	Electrical, plumbing, and mechanical systems
14610	Carbon Assessment	Assessment prior to retrofit
15140	Carpenters & Joiners	Installers
15270	Carpet Planning & Fitting	Design
15340	Carpets & Rugs – Repairing	
85114	CDM Co-Ordinators	Construction design, coordination during design and planning phase of large developments

Thomson Class Code	Description	Relevance
16320	Ceiling Contractors	
16390	Ceilings – Suspended	
16710	Central Heating – Installation & Servicing	Controls only though
16715	Central Heating Supplies & Equipment	Controls only though
17790	Chimney Building & Repairs	Airtightness
45653	Chimney Lining	Insulation
18662	Cladding Suppliers & Installers	Retrofit specialists – insulation for high-rise
67121	Climate Control	
21550	Conservatories	Airtightness and glazing
47652	Conservatory Repairs	Airtightness and glazing
21555	Construction Contractors – General	Retrofit specialists
21557	Construction Management	Retrofit specialists and refurbishment
24980	Design Consultants	Design
56787	Domestic Energy Assessors	Assessment
27247	Door & Window Furniture	Design
27380	Door Repairs	Glazing and doors
27410	Doors & Shutters – Sales & Installation	Windows and doors, airtightness
27520	Double Glazing Installers	Glazing
27530	Double Glazing Repairs	Glazing
27902	Draughtproofing Installers	Airtightness

Thomson Class Code	Description	Relevance
28380	Drilling Contractors	Retrofit specialists
85698	Dry Lining Contractors	Retrofit specialists
30045	Electrical Engineers	EE lighting
30580	Electricians	Installers of EE lighting
30590	Electricity Generating & Distributing Equipment	For HEMS only
15973	Energy Assessors-Domestic	Energy assessment
31410	Energy Conservation Consultants & Equipment	EE consulting
85744	Energy Efficient Products & Services	
31420	Energy Management Control Systems	EE and HEMS
65422	Energy Performance Certificates	Assessment
34300	Fascias & Soffits	Design and insulation
68414	Fire Doors-Sales & Installation	Doors and draughtproofing
35430	Fire Protection Consultants & Engineers	Safety on cladding in high-rise flats
54687	Fire Safety Risk Assessment	Safety assessment on cladding
35640	Fireplaces & Mantelpieces	Insulation
36420	Floor Laying, Refinishing & Resurfacing	Insulation
36640	Flooring Services	Insulation and retrofit specialists
58420	Framing	Retrofit specialists – glazing

Thomson Class Code	Description	Relevance
35224	Garage Conversions	Insulation
39050	Garage Doors – Suppliers & Installers	Doors and draughtproofing
88765	Garage Repairs & Refurbishment	
39080	Garage Services	Retrofit specialists
40470	Glaziers	Heating controls
42710	Heating Contractors	Heating controls
94589	Heating Contractors & Consultants	Heating controls
42920	Heating Equipment – Sales & Service	Heating controls
44140	House Builders	Installers
45302	Insulation Installers	Insulation
45580	Interior Designers	
45970	Joiners & Carpenters	
75065	Kitchen Installation & Supply	Design
48100	Lighting Consultants	EE lighting
48130	Lighting Contractors	EE lighting
48586	Lock Smiths	Draughtproofing
48595	Loft Boarding	Retrofit specialists – insulation
48660	Loft Conversions	Retrofit specialists – insulation
48663	Loft Insulation & Contractors	Retrofit specialists – insulation
55590	Painters & Decorators	Design

Thomson Class Code	Description	Relevance
55595	Painting Contractors	Design
56500	Patio Doors – Suppliers & Installers	Doors and retrofit specialist
58895	Planning Supervisors	Design and management
59230	Plasterers	Design
65480	Pointing	Weatherproofing and airtightness
61860	Project Management	Design and management
61896	Property & Estate Management	Design and management
61895	Property Developers	Design and management
61961	Property Maintenance & Repairs	Refurbishment
69874	Property Renovation	Retrofit specialists
62731	Quantity Surveyors	Design management and assessment
35788	Renewable Energy	Installer
45406	Roof Coatings	Refurbishment
65470	Roofing Services	Retrofit specialists
66195	Safety Glazing	Refurbishment glazing
67160	Scaffolding & Work Platforms	Building specialists
67140	Scaffolding Erectors & Hirers	Building specialists
34865	Shutters – Internal	
71520	Skylights & Rooflights	Design and windows
74070	Stonemasons	Building specialists
74345	Structural Consultants	

Thomson Class Code	Description	Relevance
74349	Structural Engineers	Design and management for large developments
74650	Surveyors – Building	Surveying
74700	Surveyors & Valuers	
77620	Thatching & Conservation Crafts	Retrofit specialists and refurbishment
38920	Tile & Flooring Restoration	Insulation
78130	Tiling Contractors – Wall, Floor & Ceiling	Refurbishment
78195	Timber Framed Buildings	Building specialists
57844	Timber Windows & Doors	Building specialists
78263	Wall Coatings	Design and refurbishment
83020	Wallpapers & Wall Coverings	Design
84740	Window Frames – Sales & Service	Installers
84770	Window Repairs & Replacement Services	Refurbishment
63214	Windows – Sash	Refurbishment
84850	Windows – Special Purpose	Refurbishment
51351	Windows – Wood	Refurbishment

Experian Total Business Count

Thomson Code	Businesses with known employee bands	Businesses with unknown employee bands	Total
11040: Builders	14,749	958	15,707
30580: Electricians & Electrical Contractors	11,197	648	11,845
55590: Painters & Decorators	6,851	569	7,420
65470: Roofing Services	5,441	559	6,000
61895: Property Developers	4,598	224	4,822
39080: Garage Services	4,391	232	4,623
61961: Property Maintenance & Repairs	3,912	407	4,319
59230: Plasterers, Screeders & Dry Lining Contractors	3,888	327	4,215
16710: Central Heating – Installation & Servicing	3,623	222	3,845
04420: Architects	3,599	144	3,743
61896: Property & Estate Management	3,424	221	3,645
21555: Construction Contractors – General	3,440	176	3,616
48586: Lock Smiths	3,027	548	3,575
45970: Joiners & Carpenters	3,252	208	3,460
27520: Double Glazing Installers	3,109	157	3,266
04422: Architectural Services	2,575	116	2,691
24980: Design Consultants	2,176	123	2,299
45580: Interior Designers	2,056	160	2,216

Thomson Code	Businesses with known employee bands	Businesses with unknown employee bands	Total
36640: Flooring Services	1,922	94	2,016
15140: Carpenters & Joiners	1,766	130	1,896
74700: Surveyors & Valuers	1,722	78	1,800
78130: Tiling Contractors – Wall, Floor & Ceiling	1,504	111	1,615
67140: Scaffolding Erectors & Hirers	1,344	71	1,415
58420: Picture & Photo Framing Services	1,259	68	1,327
74650: Surveyors – Building	1,257	56	1,313
11280: Building Consultants	1,197	36	1,233
11400: Building Services	1,123	58	1,181
11371: Building Refurbishment & Restoration Contractors	1,091	50	1,141
30045: Electrical Engineers	1,084	40	1,124
94589: Heating Contractors & Consultants	1,085	39	1,124
35430: Fire Protection Consultants & Engineers	859	37	896
35640: Fireplaces & Mantelpieces	804	39	843
62731: Quantity Surveyors	793	17	810
74349: Structural Engineers	773	23	796
40470: Glaziers	705	63	768
61860: Project Management	702	30	732
31410: Energy Conservation Consultants & Equipment	645	45	690

Thomson Code	Businesses with known employee bands	Businesses with unknown employee bands	Total
10790: Bricklaying	637	45	682
15270: Carpet Planning & Fitting	601	50	651
39050: Garage Doors – Suppliers & Installers	563	41	604
21550: Conservatories	553	44	597
48660: Loft Conversions	509	55	564
67160: Scaffolding & Work Platforms	434	20	454
27530: Double Glazing Repairs	384	37	421
18662: Cladding Suppliers & Installers	389	30	419
74070: Stonemasons	386	21	407
45302: Insulation Installers	382	24	406
31420: Energy Management Control Systems	351	20	371
55595: Painting Contractors	313	27	340
27247: Door & Window Furniture	314	23	337
16390: Ceilings – Suspended	325	8	333
84770: Window Repairs & Replacement Services	307	25	332
78195: Timber Framed Buildings	312	14	326
48100: Lighting Consultants	264	9	273
27410: Doors & Shutters – Sales & Installation	250	21	271

Thomson Code	Businesses with known employee bands	Businesses with unknown employee bands	Total
30590: Electricity Generating & Distributing Equipment	237	20	257
42920: Heating Equipment – Sales & Service	214	6	220
21557: Construction Management	200	15	215
74345: Structural Consultants	207	8	215
04424: Architectural Technologists	204	7	211
28380: Drilling Contractors	187	4	191
77620: Thatching & Conservation Crafts	158	4	162
36420: Floor Laying, Refinishing & Resurfacing	146	14	160
83020: Wallpapers & Wall Coverings	135	6	141
16715: Central Heating Supplies & Equipment	124	11	135
16320: Ceiling Contractors	104	8	112
27380: Door Repairs	98	12	110
84740: Window Frames – Sales & Service	100	6	106
48130: Lighting Contractors	93	9	102
17790: Chimney Building & Repairs	94	7	101
84850: Windows – Special Purpose	67	4	71
04440: Architectural Woodwork	55	7	62

Thomson Code	Businesses with known employee bands	Businesses with unknown employee bands	Total
44140: House Builders	54	2	56
71520: Skylights & Rooflights	46	3	49
68414: Fire Doors – Sales & Installation	40	1	41
15340: Carpets & Rugs – Repairing	21	-	21
34300: Fascias & Soffits	19	-	19
66195: Safety Glazing	18	-	18
75065: Kitchen Installation & Supply	16	-	16
95014: Bathroom Installation & Supply	14	2	16
35788: Renewable Energy	15	-	15
27902: Draughtproofing Installers	8	-	8
56787: Domestic Energy Assessors	8	-	8
69874: Property Renovation	8	-	8
54687: Fire Safety Risk Assessments	7	-	7
65422: Energy Performance Certificates	7	-	7
85744: Energy Efficient Products & Services	5	-	5
15973: Energy Assessors – Domestic	4	-	4
63214: Windows – Sash	4	-	4

Thomson Code	Businesses with known employee bands	Businesses with unknown employee bands	Total
75312: Cellar & Basement Conversions	4	-	4
15444: Air Tightness Testing	3	-	3
57844: Timber Windows & Doors	3	-	3
85114: CDM Co-ordinators	2	1	3
35224: Garage Conversions	1	1	2
45406: Roof Coatings	2	-	2
65428: Building & Extension Plans	2	-	2
65480: Pointing	2	-	2
85698: Dry Lining Contractors	2	-	2
88765: Garage Repairs & Refurbishment	2	-	2
14610: Carbon Assessment	1	-	1
34865: Shutters – Internal	1	-	1
48595: Loft Boarding	1	-	1
48663: Loft Insulation & Contractors	-	1	1
Total	116,960	7,757	124,717

Keywords for Web-Harvesting

	Primary Terms	Secondary Terms	Specific Terms	Comments
Sector	Domestic	Construction	Home, house new build, owner-occupied, Private Rented Sector (PRS), houses in multiple occupancy (HMOs), social housing, small terrace, medium terrace, large terrace, semi-detached, detached, bungalow, converted flat, apartment, purpose build flat low rise, purpose build flat high rise, on-grid gas, off-grid gas, social housing low-cost accommodation, country house, stately home, Victorian, listed building.	N/A
Broad area of interest	Retrofit	Refurbishment, refit, upgrade, energy efficiency, optimisation, renovation, 'fabric-first', extension	N/A	N/A
Specific areas of interest	N/A	N/A	Retrofit designers, architects, building surveyors, energy service company (ESCO), energy supplier, companies, retrofit co-ordinators, energy assessors, lighting consultants, project managers, retrofit surveyors, retrofit assessors, retrofit advisor, energy specialists, principal contractors, engineers, Energy Performance Certificate (EPC) insulation, cavity wall, cladding, glazing, energy efficient lighting, draught proofing, draught stripping, airtightness testing, conservatory conversion, Building Energy Management Systems (BEMS), Home Energy Management System (HEMS), Building Automation and Control Systems (BACS), heating controls.	'We were interested in installers, design, construction management and repairers but not manufacturers.' 'We were not interested in refurbishment where it relates solely to measures such as painting and decorating but are interested in tradespeople involved in these activities that would be needed following retrofit work.'

Experian Screened and Adjusted Business Counts

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Air Tightness Testing	3	1	0
Architects	3,738	311	284
Architectural Services	2,689	220	201
Architectural Technologists	211	22	19
Architectural Woodwork	62	3	0
Basement & Cellar Conversions	0	0	0
Bathroom Installation & Supply	16	0	0
Boilers – Servicing, Replacements & Repairs	1	1	0
Bricklaying	678	17	0
Builders	15,665	575	447
Building & Extension Plans	2	0	0
Building Consultants	1,230	61	49
Building Refurbishment & Restoration Contractors	1,135	39	31
Building Services	1,178	78	48
Car Body Repairs	1	0	0

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Carbon Assessment	1	0	0
Carpenters & Joiners	1,897	28	6
Carpet Planning & Fitting	644	5	0
Carpets & Rugs – Repairing	21	0	0
CDM Co-Ordinators	3	0	0
Ceiling Contractors	112	3	0
Ceilings – Suspended	329	12	0
Cellar & Basement Conversions	4	0	0
Central Heating – Installation & Servicing	3,839	92	61
Central Heating Supplies & Equipment	135	7	4
Chimney Building & Repairs	100	5	0
Chimney Lining	0	0	0
Cladding Suppliers & Installers	417	23	0
Climate Control	0	0	0
Conservatories	598	30	30
Conservatory Repairs	0	0	0

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Construction Contractors – General	3,605	342	257
Construction Management	214	22	17
Design Consultants	2,293	26	9
Domestic Energy Assessors	8	1	0
Door & Window Furniture	336	16	5
Door Repairs	111	1	0
Doors & Shutters – Sales & Installation	270	15	8
Double Glazing Installers	3,255	233	224
Double Glazing Repairs	424	7	7
Draughtproofing Installers	8	1	0
Drilling Contractors	191	4	0
Dry Lining Contractors	2	0	0
Electrical Engineers	1,118	47	16
Electricians	0	0	0
Electrical Testing & Inspecting	1	0	0
Electricians & Electrical Contractors	11,816	344	277

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Electricity Generating & Distributing Equipment	258	34	0
Energy Assessors – Domestic	4	0	0
Energy Conservation Consultants & Equipment	688	101	65
Energy Efficient Products & Services	5	0	0
Energy Management Control Systems	373	41	31
Energy Performance Certificates	7	0	0
Fascias & Soffits	19	0	0
Fire Doors – Sales & Installation	41	5	0
Fire Protection Consultants & Engineers	893	43	26
Fire Safety Risk Assessments	7	0	0
Fireplaces & Mantelpieces	839	19	0
Floor Laying, Refinishing & Resurfacing	162	2	0
Flooring Services	2,015	45	0
Framing	0	0	0
Garage Conversions	2	0	0

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Garage Doors – Suppliers & Installers	599	24	12
Garage Mechanics	1	0	0
Garage Repairs & Refurbishment	2	0	0
Garage Services	4,613	7	0
Glaziers	767	18	6
Heating Contractors	0	0	0
Heating Contractors & Consultants	1,120	64	64
Heating Equipment – Sales & Service	220	18	0
House Builders	56	1	0
Insulation Installers	405	85	47
Interior Designers	2,211	39	15
Joiners & Carpenters	3,456	45	30
Joinery Centres	1	1	1
Kitchen Installation & Supply	17	0	0
Lighting Consultants	272	17	9
Lighting Contractors	102	6	3
Lock Smiths	3,575	3	0

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Loft Boarding	1	0	0
Loft Conversions	562	21	18
Loft Insulation & Contractors	1	0	0
Painters & Decorators	7,407	55	16
Painting Contractors	342	7	0
Picture & Photo Framing Services	1,325	1	0
Patio Doors – Suppliers & Installers	0	0	0
Planning Supervisors	0	0	0
Plasterers	0	0	0
Plasterers, Screeders & Dry Lining Contractors	4,212	82	36
Plumbers	1	0	0
Pointing	2	0	0
Project Management	726	7	2
Property & Estate Management	3,633	83	18
Property Developers	4,814	256	160
Property Maintenance & Repairs	4,308	71	49

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Property Renovation	8	0	0
Quantity Surveyors	803	9	9
Renewable Energy	14	2	0
Roof Coatings	2	0	0
Roofing Services	5,986	221	117
Safety Glazing	18	0	0
Scaffolding & Work Platforms	455	18	0
Scaffolding Erectors & Hirers	1,411	58	12
Shutters – Internal	1	0	0
Skylights & Rooflights	49	6	0
Solar Energy Equipment	1	0	0
Stonemasons	407	18	0
Structural Consultants	215	18	0
Structural Engineers	795	53	53
Surveyors – Building	1,308	104	69
Surveyors & Valuers	1,800	88	47
Thatching & Conservation Crafts	162	3	0

Experian Screened and Adjusted Business Counts Thomson Code	Total Business Count	Screened Business Count	Adjusted Screened Business Count
Tile & Flooring Restoration	0	0	0
Tiling Contractors – Wall, Floor & Ceiling	1,611	21	7
Timber Framed Buildings	325	40	20
Timber Windows & Doors	3	1	0
Wall Coatings	0	0	0
Wallpapers & Wall Coverings	142	1	0
Window Frames – Sales & Service	106	5	0
Window Repairs & Replacement Services	330	30	30
Windows – Sash	4	0	0
Windows – Special Purpose	71	8	8
Windows – Wood	0	0	0
TOTAL	124,452	4,497	2,977

Data Analysis and Findings

The main report has detailed the range of businesses in each sector and the confidence levels in these estimates. The following section looks at the data analysis process in most detail and breaks down the estimates for each part of the sector. Where relevant, numbers have been compared against other relevant sources and these are laid out in the section for each measure. These sources include:

- Trustmark tradesperson search online – this consisted of searching for tradespeople that are registered with Trustmark via the Trustmark 'find a local tradesperson' function on the website. This number is likely to be lower than the actual number as it only includes those registered with Trustmark and included on their website.
- South East Net Zero Hub – This is the most recent of the research included in the benchmarking section. It only features businesses in the Greater South East area which includes London. The numbers for the South East (SE) have been included but also for England. It was estimated that the South East makes up approximately 44 per cent of the GDP of England so the numbers estimated for the South East have been rebased by this percentage.
- Non-domestic EE report - This report was included in the benchmarking and contains business estimates for the non-domestic supply chain. As there is viewed to be a lot of cross-over these numbers have been included here also.
- Trade association counts – This is the estimate provided by trade associations who were contacted to verify estimated business counts.
- ONS UK business – This dataset is released each year and provides counts of UK businesses by activity, size, and location. It uses 4 digit SIC codes which are not especially granular and covers the whole of the UK and not just EE, so is likely to over-inflated for these counts.
- Nomis Census business counts – Nomis is a service provided by the ONS and published statistics related to the labour market at national, regional, and local levels. It uses 5 digit SIC codes which are more granular and is just for England.

Insulation

It was challenging to establish a definitive number of businesses in the insulation supply chain. There are a few reasons for this:

- Only some insulation installers appear to record themselves under the Thomson Code '45302 Insulation Installer'. This is likely because often these businesses carry out different activities and may use codes such as '48863 Loft Insulation & Contractors' or '65470 Roofing Services'
- There is no specific SIC code for insulation installers, so it was not possible to cross check any numbers with this. On checking Companies House, insulation installers use a range of SIC codes including '43290 Other construction installation' or '43999 other specialised construction activities not elsewhere classified'. There is a SIC code (4333)

for Floor and Wall Covering but on further research this is related to carpet, flooring, wallpaper etc. rather than insulation.

- Insulation could also fall within roofing services and render and cladding but it is difficult to establish the numbers working on EE within these industries.

The Experian check of insulation installers returned a number of 405. This seemed low judging on knowledge of the industry and so was cross checked with other sources.

Table 3: Summary of insulation business counts provided by other sources

Source	Experian	Trustmark Trades-person search online	SE Net Zero Energy Hub	Non-domestic EE report count	Nomis Census	Trade Association count
Number or range identified for insulation installers	405	1,530	1,936 SE 4,397 England	7,884	-	-
Number or range identified for roofing services	5,986	277	185	8,620	9,215	-
Number or range identified for insulated render and cladding services	417	638	471	-	-	-

The National Insulation Association (NIA), National Federation of Roofing Contractors (NFRC) and The Insulated Render and Cladding Association (IRC) were contacted to check the number of insulation installers but a response was not received.

Total count range – 6,000 – 7,900

Confidence level – Low

Energy Efficient Lighting

A representative from the Lighting Industry Association (LIA) was not able to provide an estimate of the number of businesses in the sector but gave some insight on why it was

challenging to quantify this number. The Electrical Contractors Association (ECA) also responded with some insight and provided a report to consider.

For energy efficient lighting, re-wiring is not required and current light fittings can be used, so many individuals feel comfortable changing lightbulbs themselves. Therefore, there are not specific electricians carrying out installation of energy efficiency lighting on a small owner-occupied or landlord rental scale. For larger projects, lighting will be installed by an electrician who comes within a 'package of works' for a big contractor, which will cover a whole host of electrical tasks rather than just energy efficient lighting. Therefore, where professional installation is required for EE lighting it is carried out by electricians rather than a separate stand-alone lighting occupation.

The ECA referenced a labour market intelligence report on the electrotechnical field that illustrated that maintenance of domestic properties makes up about 46 per cent of work on average.[12] This report also referenced that there has been an uptick in work related to the net zero agenda since 2020. This report referenced that EE services including lighting replacement had increased from 24 per cent of business activities in 2020 to 35 per cent in 2023. The trade associations suggested using this percentage based on ONS statistics for electricians or using ONS figures for electricians where 25-30% of the labour requirement would be required for lighting.

The Thomson Code assessment identified codes such as '48100 Lighting Consultant' or '48130 Lighting Contractor' but these were confirmed by the LIA to be related to luxury upgrades rather than energy efficiency and so have not been utilised. The other relevant Thomson Code is '30580 Electricians and Electrical Contractors', however separating out installation of energy efficiency lighting from these roles is challenging. A Summary of business counts found is shown in Table 4.

Table 4: Summary of energy efficient lighting business counts provided by other sources

Source	Experian (Electricians & Electrical Contractors)	Nomis Census	ONS UK Business	Non-domestic report count	Trade Association count
Number or range identified for lighting	11,816	42,185	49,235	12,960 – 21,292	213,600 (all electrotechnical)

The report above gave a percentage of 32 per cent of electrical business activities involved in EE services. This was taken from the Nomis Census figures for England shown in Table 4 to give a value of 17,232.

[12] The Electrotechnical Skills Partnership (2023) Labour Market Intelligence: Refresh – 2023, carried out by Pye Tait consulting. Available: here.

Total count– 17,232

Confidence level – Medium

Airtightness

The Experian data only returned a very low number of businesses under the Thomson Code '15444 Air Tightness Testing' so this number was disregarded. The Building Compliance Testers' Association (BCTA) responded on behalf of the Air Tightness Trade Association (ATTIMA). They gave a best estimate of around 300 companies working in the airtightness sector. They highlighted that many of their members do a lot of different activities, and few companies just do airtightness alone.

Total count– 300

Confidence level – Medium

Doors and Windows

The Experian data included various Thomson Codes that could be relevant to doors and windows including '27380 door repairs', '84770 window repairs and replacement services' and '27520 double glazing installers'. The most relevant count was for double glazing installers which gave a number of 3,255.

The Glazing and Glass Federation (GGF) responded to the request for information and clarified that the estimate of 3,255 was likely much too low. They suggested that the Fenestration Self-Assessment Scheme (FENSA) numbers would be much accurate. FENSA is an industry-led UK scheme to allow self-certification of replacement window and door installations to Building Regulations. Every piece of work that FENSA does is obliged to be EE and this is part of the licensing, so it is a good indication of the number of installers. There are 6,500 glazing companies registered which FENSA and this is estimated to be about 70 per cent of the businesses who complete 80 per cent of the work. Installers are not obliged to join FENSA but it is recommended and most do join. A summary of business counts found is shown in Table 5.

Table 5: Summary of door and window business counts provided by other sources

Source	Experian (double glazing installers)	Nomis Census	Non-domestic report count	ONS UK Business	Trade Association Estimate
Number or range identified for doors and windows	3,255	3,075	11,000	16,205	6,500 (representing 70% of the businesses)

Total count range – 7,800 – 11,000

Confidence level – Medium

Energy Management

The Experian data provided a count of 373 businesses involved in energy management systems.

There was little means to verify these numbers further as there is little available information about the number of businesses involved in Energy Management. The British Electrotechnical and Allied Manufacturers' Association (BEAMA) were contacted but no response was received and there are no SIC codes for energy management. An overview of the business counts found is shown in Table 6.

Table 6: Summary of energy management business counts provided by other sources

Source	Experian (energy management control systems)	South East Net Zero Energy Hub	Trade Association Estimate
Number or range identified for Energy Management Control Systems	373	112 SE 254 England	-

Total count range – 330 – 410

Confidence level – Low

Design and Management

Design and management can be split into a number of different roles and using the Experian data business counts were found for Architects and Surveyors. Within design and management it is difficult to estimate the number involved in EE as, similar to Lighting, not all will carry out EE measures although some will sometimes.

The Royal Institute of British Architects (RIBA) and Royal Institute of Chartered Surveyors (RICS) were contacted and a response was received from RIBA. RIBA provided a reference to the Council of Europe report that gave a breakdown of the number of architects by country. It also provided some breakdown by the proportion of architects using sustainable concepts frequently, including 'low energy buildings (LEB: 45 per cent)' 'nearly zero energy buildings (NZEB: 16 per cent)', 'plus energy buildings (PEB: 8 per cent)' and 'circular design (CD: 16 per cent)'. These proportions have been applied to the trade association estimate for reference. A summary of architect business counts is shown in Table 7.

Table 7: Summary of architect business counts provided by other sources

Source	Experian	Nomis Census	Non-domestic report count	ONS UK Business	Trade Association Estimate
Number or range identified for Architects	Architects: 3,738 Architectural Services: 2,689 Design Consultants: 2,293 Total: 8,720	13,185	6,795 – 7,515	17,570	11,603 LEB: 5,221 NZEB: 1,856 PEB: 928 CD: 1,856

Total count range – 8,700 – 9,500

Confidence level – Medium

Limitations of Demographic Analysis and Experian Data Collection

It is important to recognise some limitations of the Experian data collection and therefore the demographic analysis.

- **It was not possible for Experian to consistently distinguish between businesses that work on domestic buildings as opposed to only non-domestic buildings.** This is because many businesses work in both sectors and the Thomson Codes do not provide the level of detail to separate this. Efforts were made to screen out businesses that work exclusively outside of scope, but there may still be some that are included. In research on the non-domestic EE supply chain, it was found that 86 per cent of respondents in the non-domestic retrofit businesses also provided the same services to the domestic building sector. Estimates for domestic/non-domestic varied for different measures and relevant measures have been referenced below:[13]
    - Insulation, doors and windows, lighting: 28 per cent - 46 per cent
    - Design and management: 32 per cent - 64 per cent
- **It is possible that relevant businesses were screened out from the Total Count**.

[13] Eunomia Research & Consulting, for BEIS (2021) Non-domestic energy efficiency optimisation and retrofit supply chain study.

  - Businesses can only have one self-assigned Thomson Code. If their activities span multiple codes, but the primary activity they have chosen as their code is one that is out of scope of this project, then they will have been excluded. For example, while Thomson Codes exist for activities such as insulation, the number of businesses that report using this Code is not especially high as businesses may perform other activities such as roofing and use this code as their primary code instead. It only allows for one activity per business so does not show how many businesses offer different EE services.
  - The web-harvesting approach only looked at the text on the top level of pages of a company's website. Therefore, if keywords feature on a different page lower down in the website's content, then they will have been excluded from the Screened Count. This may bias the results against larger businesses with more complex websites.
  - Some websites are restricted and do not allow access for the Experian searching tools used with web harvesting. Therefore, Experian are not able to screen these websites, and so the businesses would not be included within the Screened Count.
  - If businesses use words and phrases to describe their activities that were not included in the key words sent to Experian (see Keywords for Web-Harvesting), then these would not have been included.

- **The Experian database covers 97 per cent of businesses.** While this is good coverage, it is not comprehensive and so some businesses may have been excluded because they do not feature here.
- **As some businesses are engaged in domestic and non-domestic retrofit and in EE and non-EE, the methodology aims to include all businesses that work at least partly in this sector.** The Screened Count will therefore tend to overestimate the overall size of the supply chain as these firms are also engaged in other aspects of their business unrelated to domestic retrofit.
- The initial quality review of the data included two key activities: checking a sample of Screened Count business websites for relevance; and checking that some known relevant businesses were in the Screened Count. This identified that:
  - **90 per cent of the Screened Count businesses were considered very relevant to the study, with 10 per cent not relevant due to a lack of domestic focus or their main working activity wasn't in scope.** Certain codes e.g., bricklaying, ceiling contractors and drilling contractors having higher levels than average of irrelevant businesses.
  - **~2 per cent of those screened were identified as duplicates or inactive websites, with the assumption being that these businesses are now inactive.** Experian contact businesses every 6-12 months to verify Thomson **C**odes, so the number that are no longer active should be relatively small.
  - **There were around 50 Thomson Code groups which had limited or no organisations in the Screened count; some Thomson Codes e.g., air**

tightness testing, carbon assessment and draughtproofing installers appeared low on numbers and some Thomson Codes had Screened Counts of zero relevant businesses e.g., climate control. This was due to there being a low number of organisations in the Screened Count or the web harvesting terms being too specific, leading to a deselection of relevant businesses. **To tackle this issue, those Thomson Codes that are known to be relevant will be sampled manually and the businesses added to the screened business count if deemed relevant.**

- It was challenging to establish the number of businesses specifically working on EE. There are several reasons for this, but many businesses work on both EE and non-EE projects unless their business is specifically focused on EE and there is very little data or secondary research that splits this. EE is also defined differently in different areas; for example, some include heat, electricity, and ventilation while this project does not.

Interviews with Industry Stakeholders

Methodology

Interviews were undertaken with installers, key professionals, construction businesses, and skills providers. They aimed to provide an understanding of the way installers and construction businesses make decisions on whether to take on EE retrofit work and the barriers and enablers to entering the EE retrofit market.

At the stage of commencing the interviews there were still uncertainties about the size and profile of the populations being studied. This was further investigated while analysing the supply chain characteristics through the demographic analysis. It was agreed with DESNZ that up to 120 interviews would be conducted with the supply chain.

The sampling approach was purposive and therefore was not intended to be representative of the supply chain, this is in-line with the aims of the research; to achieve a range and diversity of opinions. Eunomia's partner, PFA Research, conducted the interview recruitment and used telephone calls as the main mode of recruitment. Where stakeholders agreed to participate in the study, they were invited to a 45-minute virtual Teams interview with one of the interview team. Participants were provided with an information sheet that gave further details on the project and a letter of support from DESNZ that sought to add authenticity to the request for interview. The interview team was made up of Eunomia and Eunomia's partner the National Centre for Social Research. PFA Research continued to monitor recruitment to ensure that potential participants matched the sample quota as far as possible.

Sample Strategy

Of the 124,452 businesses matching the identified relevant Thomson Codes, Experian's web harvesting returned 4,497 likely to be involved in the EE retrofit supply chain. As Experian is said to cover 97 per cent of UK businesses, these 4,497 businesses were the best available sample frame to be used for the interview recruitment (hereafter these 4,497 businesses are referred to as the 'Experian dataset'). More information on Experian and the dataset can be found in *Demographic Analysis*. The Experian dataset was used to recruit EE stakeholders and non-EE stakeholders. For skills providers, Eunomia self-researched businesses that would be relevant and added this to a 'skills provider database'. The Experian dataset and skills provider database were shared with PFA Research to contact for interviews.

The high-level sample breakdown of the stakeholder groups recruited for interview is presented in Table 8.

Table 8: Sample Breakdown of stakeholder groups

Stakeholder Group	Target no. of interviews	No. of Interviews Completed
EE Stakeholders (Installers, key professionals, and construction businesses)	77	64
Non-EE Stakeholders (non-EE Installers and non-EE construction businesses)	15	3
Skills Providers	30	11
Total	**102**	**78**

The Experian dataset contains information about each of the relevant businesses identified and thus was also used to develop inform sample quotas for the interviews. This includes activity type, region, and size of business (by number of employees). Construction workers were assessed separately from installers as this split was available in the data.

The interview sample was stratified according to several criteria. The four 'primary' criteria are outlined below and were used to develop quota targets. The aim of these quota targets was to achieve a good range and diversity across the sample but not be representative. They have been chosen for two reasons: i) they are considered to be the most likely factors to influence business perspectives, and ii) there is available data that can be used to develop quota targets that are proportionate to the populations being studied.

- **Geography** (region within England);
- **Type of activity or services offered** (an overview of the activity or services that are within the project scope are outlined in the Overview of Energy Efficiency Measures in Scope;
- **Business size** (no. of employees); and
- **Stakeholder role** (whether installer, key professional or construction business)

A sampling quota was used for EE stakeholders and is shown in Table 9. A set of relevant characteristics were identified for each criteria and quotas were set for each characteristic to achieve range and diversity within the sample. Sampling quotas were not used for non-EE stakeholders and skills providers due to the difficulties in recruiting these groups. It was initially intended to recruit 20 non-EE participants and 30 skills providers but it was especially difficult to recruit participants for these interviews. A total of three non-EE stakeholders were recruited and 11 skills providers. The recruitment process also began with higher targets for EE stakeholder interview numbers, but these needed to be reduced given the realities of

recruitment with the sector and barriers experienced when recruiting. The project also had a limited time frame with which to complete the interviews. The barriers experienced during recruitment and resulting limitations have been discussed further in the Research Challenges and Limitations Section.

Table 9: Sampling quota for EE stakeholders

N= 70 **Criteria**	**Characteristics**	Target **No.** of **interviews**	No. of Interviews Completed
Region	North	Min 20	11
	Midlands	Min 13	13
	East	Min 8	9
	South West	Min 7	4
	South East, including London	Min 22	26
Type of activity/ measure[14]	Insulation	Min 12	It was not possible to track one single primary activity for most stakeholders[15]
	Lighting (e.g. energy efficient lighting)	Min 12	
	Airtightness (e.g. draught-stripping)	Min 12	
	Doors and windows (e.g. double glazing)	Min 12	
	Energy management (e.g. heating controls)	Min 12	
	Design and management (e.g. architects, retrofit designers, co-ordinators, principal	Min 12	

[14] It was intended that this would be judged based on 'primary' activity, in recognition that companies might be involved in more than one.
[15] During the recruitment, PFA found that many stakeholders carried out multiple different but equally important roles and thus couldn't define a single primary activity, meaning this sampling quota could not be accurately tracked.

N= 70 **Criteria**	**Characteristics**	Target **No.** of **interviews**	No. of Interviews Completed
	contractors and project managers)		
Business size[16]	<10 employees	Min 56	46
	10-50 employees	Min 10	11
	>50 employees	Min 4	5
Business type	Installer	Min 20	26
	Key Professional	Min 20	25
	Construction Business	Min 30	13
Total		**70**	**63**

Data Analysis

The interviews focused on business models, demand for EE retrofit business, current and future skills, incentivising towards EE services and the role of government. Topic guides were produced for each stakeholder group. The topic guides translated the RQs into questions suitable for an interview format including additional prompts and probes where required. Notes taken during the interviews and transcripts, where required, formed the basis of the qualitative data for analysis and were written up into an interview thematic analysis matrix which categorised each response by RQ. Thematic analysis was carried out on the qualitative data to identify themes in responses. The thematic matrix allowed for the full range of views to be compared and contrasted and for patterns and themes to be identified and explored.

[16] One organisation did not have a total number of employees in the Experian dataset and thus business size could not be calculated. This explains why business size only totals 62.

Focus Groups

Methodology

Focus groups were carried out with trade bodies, industry experts and net zero energy hubs to explore the perspectives of organisations and individuals who are involved in the industry in capacities other than as direct skills users or providers. This was chosen as a method for these groups to reveal diverse understanding, which is often difficult to assess by other methods of data collection. The intention was to run three separate focus group sessions with each of the stakeholder groups. The Eunomia team researched potential candidates for the focus group sessions devising a list of 100 contacts who may be interested in the research. Eunomia's partner PFA Research lead the recruitment. They contacted potential participants by email and phone.

Participants that agreed to take part were provided with an information sheet that gave further details on the project and a letter of support from DESNZ that sought to add authenticity to the request to attend a focus group. They were also asked to complete a consent form before attending the focus groups.

Two focus groups were carried out and two in-depth interviews with those who could not attend the focus group dates. In total 17 participants were involved in the focus groups and the breakdown of participants in the different groups is shown in Table 10.

Table 10: Stakeholder Groups and Number of Participants for the focus groups

Stakeholder Group	Number of participants
Trade bodies	9
Industry experts and trade bodies	6
Industry expert in-depth interview	1
Net zero energy hub in-depth interview	1
Total	**17**

Data Analysis

The focus groups aimed to discuss specific RQs, including the capacity of the EE retrofit supply chain, the skills and specialisms in the sector, barriers and enablers to expanding the capacity of the sector and the role of government. An overview of the interview findings for

these topics were shared with participants and they were then asked specific questions in relation to them.

Topic guides were devised for the focus groups to ensure the relevant questions were covered. The focus groups were then delivered using PowerPoint slides and a Mural board reflecting the approach from the topic guides. Mural is a digital whiteboard and key RQs were shared with participants through Mural. Participants were asked to provide answers to the questions in virtual sticky notes on Mural and were also given some opportunity to discuss key points at the end of each section. Following the sessions, the notes from Mural were written up alongside any notes from verbal conversations that occurred between participants. The notes were written up into an analysis matrix categorised by RQ and then broken down into key themes within each RQ. A similar process was taken for the industry expert and Net zero energy hub in-depth interviews, except PowerPoint and Mural were not used, so the notes were written up and then added to the focus group analysis matrix.

Research Challenges and Limitations

Overall, the research was able to show the gaps that exist in the EE retrofit supply chain and how fragmented/trade-based the existing EE retrofit market is. It is important to discuss the research challenges and limitations, but this is not intended to detract from the significance of the conclusions made from the research.

Overall Sector Challenges

- Lack of available granular quantitative data on domestic installers makes it difficult to identify the supply chain and understand any demographic, regional or other variations.
- Installers tend to work across multiple sectors, including domestic and non-domestic properties and perform a variety of construction activities. This diversity of the EE retrofit sector makes it difficult to ascertain their key skills and core services. This also creates challenges for identifying the size of the supply chain.
- The UK domestic building stock is diverse, including traditional buildings, new builds, and purpose build high-rise flats, making it challenging to map what specific skills are needed. For example, PAS 2035 require additional expertise for retrofitting traditional properties as heritage needs to be preserved while also improving EE.
- The boundaries between renovation, refurbishment and retrofitting can be unclear. Renovation refers to home repairs and construction, such as improvements or modernisation. Refurbishment implies improvement by cleaning, decorating, and re-equipping. Retrofitting refers to the installation of a component or feature that was not in place when the building was constructed. These unclear boundaries make identifying workers focused on the domestic sector challenging.

  Further to the above on refurbishment vs renovation vs retrofitting, there were installer and construction interviewees that were unsure to what extent energy efficiency was the drive behind a home refurbishment/renovation including energy efficiency upgrades e.g., a householder may have their kitchen renovated for style and functionality, but at the same time would upgrade their glazing and lighting.
- For design and management there is a lack of clarity on the role of architects in the retrofit process/market and how they might fit in to the bigger picture. During the interviews it was apparent that architects do play a significant role so it may have been worth speaking to more of them.
- Impacts from the UK's exit from the European Union, cost-of-living crisis, and the COVID-19 pandemic creating a large impact on EE markets and activity within the retrofit scene. It was difficult to know which factor(s) were at play and whether these were the reasons for uptake of EE retrofit, or whether other factors were at play e.g., communication/awareness, funding, sector buy-in etc.

Primary Research Challenges

Limitations of the recruitment process – details on call outcomes

Eunomia's partner PFA Research tracked the outcome of the recruitment and in total 22 per cent of calls resulted in a refusal. 37 per cent of calls were left in an 'open' status whereby the participant or organisation said to 'call back later' or 'try again another day' or similar. 26 per cent of contacts were not in the target sector, either as they worked for non-domestic and not domestic, or they worked in an industry that was out of scope for this project. This is shown in more detail in Table 11.

Table 11: Outcomes of the recruitment calls

Open	Refusal	Not in target sector	Recruited	Ceased trading	Duplicate	Exhausted	Phone number issue
37%	22%	26%	2%	0%	0%	3%	9%

In addition, installers were the stakeholder group that were most likely to refuse with 31 per cent of installers refusing, closely followed by construction businesses where 24 per cent refused. Key professionals had the lowest refusal rate at 16 per cent.

This refusals data gives an overview of the outcomes of the recruitment calls for this project but are not representative of refusals data in a wider context and hence the numbers should be interpreted with caution.

Interviews

- It was difficult to recruit non-EE stakeholders for interview. Many did not want to give their time as they didn't see how their opinion would be valid for research on EE when they didn't work in EE.
- It was also difficult to recruit skills providers. Eunomia developed a database of around 30 skills providers but it was hard to find skills providers who were suitable so there were proportionally fewer candidates with whom to engage. Given that only 30 skills providers were on the database the original target of interviewing 30 was quite untenable. However, those that were interviewed did provide some very useful insights.
- It was easier to engage key professionals but difficult to involve construction businesses and installers. This was due to the following factors:
    - Load of work, with many being extremely busy post-Covid-19 and post-Britain's exit from the European Union. PFA Research observed a huge drop off in the construction sector post-pandemic.
    - Research fatigue, with many refusing to accept research calls due to 'getting too many of these calls'.

  - Installers and construction businesses often work long hours on-site and so find it difficult to find time for an interview. Interview slots were given early in the morning and later at night, but this only helped to engage a few stakeholders.
  - Many installers and construction businesses already had plenty of existing work, coupled with labour shortage, and so didn't see the need to expand into EE retrofit in a big way. As a result, it was interpreted that this may have meant they weren't as interested or focused on the aims of study as they might have been if they needed this type of work.
- Installers work can be described as 'on-the-go' and the nature of this work meant that interviewees were often on-site/travelling during interviews. This is not the ideal environment for conducting an interview and meant that sometimes interviewees were distracted or trying to finish the call quickly so they could return to work.
- Some interviewee businesses installed retrofit measures, but they tended to focus on measures that were particular to their trade (for example LED lighting, insulation, window fitting) or that were out of scope for the study (for example heat pumps, solar panels). This meant they were quite restricted in what they could respond to in a meaningful way.
- The line between EE work and general work is blurred and installers would often form responses based on their whole business even if EE only made up a small percentage of their work. This means that some of the comments may not represent EE work specifically.
- Some politically motivated responses where anti-government perceptions may have swayed views, such as listing more barriers and challenges rather than benefits and opportunities. This also included less relevant suggestions for getting the UK out of the economic crisis and other activities not specific to EE retrofit.

Focus Groups

- It was hard to recruit net zero energy hubs for the focus groups and only two participants were engaged for an in-depth interview rather than a focus group discussion. There is no specific reason for this but there are a few suggested contributory factors:
  - The net zero energy hub focus groups had a short lead in time, with participants not being given that much prior notice. Therefore they had limited availability owing to clashing calendar engagements.
- There was a DESNZ event occurring at a similar time to the focus groups which meant that some stakeholders had opted to attend this and didn't have time to attend a focus group discussion also.
- Many focus group members were concerned that ventilation was not in-scope for this research and believed that this added to the fragmented nature of the industry and took away from the potential conclusions that could be made. This didn't prevent them from participating in the research but it was raised by a number of participants as a concern.

Limitations

- The aim was to carry out 120 interviews initially, but this target was then reduced to 102. In total only 78 interviews were carried out. There were very few interviews with non-EE stakeholders and only three were carried out in total.
- The aim was to run sessions with 30 focus group attendees with three sessions of 10 attendees but in total there were only 15 focus group attendees with six in one group and nine in another, and two in-depth interviews.
- As most stakeholders work on a range of measures, sometimes their responses were not specific to EE measures in scope of this project. As a result, some input may reflect the sector or measures in general rather than specific in-scope EE measures.
- Given small sample sizes, the findings are not generalisable to the entire EE retrofit population.
- Interviews can have issues with subjectivity such as personal biases of the interviewer, inconsistent interview questions and a lack of calibration. This was mostly avoided as consistent questions in topic guides were used by all interviewers and although interviewers wrote up their notes, the analysis was carried out by different individuals reducing any confirmation bias. There is a small amount of inedible interview biases that cannot be avoided.
- There was some overlap or confusion between energy efficiency and renewable energy. The experience of some interviewees referring to heat pumps, solar PV, and biomass boilers. This included reference to experience with solar PV grant funding schemes and how that impacted their views on government-lead energy efficiency schemes, which may not be entirely relatable (e.g., different departments, market etc.). Participants were steered away from discussing this during the interviews and were also reminded of the scope at the beginning of the interview. Interviewees were informed that if they did discuss over sectors such as this, they would be steered back to EE retrofit related themes.
- Likewise, some interviewees were very passionate about an unrelated topic, which they would return to multiple times in the interview. This meant less time was spent on other topics before they either had to end the call for other work or interviewer had to end for other work. Similarly to the point above, participants were steered away from these topics where possible and were informed that this would happen at the beginning of the interview.
- Some interviewees had very limited involvement in EE retrofit but would install low energy lighting for example as part of a refurb or would install heating controls occasionally. The responses from these interviewees may not best reflect views or experiences from those more involved in the EE retrofit scene.
- Those able to give time to this were often nearing retirement or well established financially (especially the architects) and working on ‘hobby’ projects. They prioritise environmental impact, as they have fewer financial worries. This may affect how well the market is represented, as the younger busier, less well-off professionals may have

different priorities. For example, installers who rejected us at recruitment stage would probably want a higher financial incentive to pursue EE retrofit.

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