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Central London Forward

**Low Carbon Retrofit Labour Demand
Analysis**

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EXECUTIVE SUMMARY

Central London Forward (CLF) commissioned this research to obtain a better understanding of the construction labour demand for low carbon retrofit work within the twelve CLF boroughs and therefore help inform future skills strategies.

The research has sought to understand the scale of the labour demand required to improve the energy performance of the existing building stock in the CLF boroughs based on information recorded in domestic and non-domestic Energy Performance Certificates (EPCs). It has also investigated the potential occupational pressures exerted by low carbon retrofit work when put in the wider context of all construction work taking place in the Greater London region.

EPCs contain recommendations which should be implemented to improve the energy performance of buildings. We have assumed that interventions are put in place to meet these recommendations and have modelled the labour demand using CITB's Low Carbon Labour Forecasting Tool. Further analysis has been undertaken to account for the properties which do not have an EPC which we assume will follow the same distribution as those properties which do have an EPC.

In total there were **1.91 million interventions: 1.67 million on domestic EPCs and 240,000 on non-domestic EPCs**. The top two interventions on domestic properties are fabric-related: i) internal solid wall insulation and ii) glazing retrofit. Alone, these two items account for over 44% of the interventions for domestic buildings. Among non-domestic buildings, the highest number of interventions is for the installation of smart systems along with glazing retrofit.

We estimate that around **163,000 person-years of labour demand** would be needed to deliver the low carbon retrofit measures. The analysis shows that **a significant portion of the total labour demand will be for five occupational groups: building envelope specialists¹, plumbing and HVAC trades, construction trades supervisors, scaffolders, and roofers**. Combined, these five occupations are expected to account for approximately 62% of the low carbon labour demand.

Five scenarios of the rate at which interventions are rolled out across different types of properties have been developed in conjunction with stakeholders in the CLF boroughs. These take account of, for instance, work being undertaken earlier in social rented domestic properties and public non-residential properties and the extent to which properties in different EPC bands are retrofitted. Depending on the scale of the rollout there would be an **average annual labour requirement of between 13,000 and 17,000 people over the next five years**.

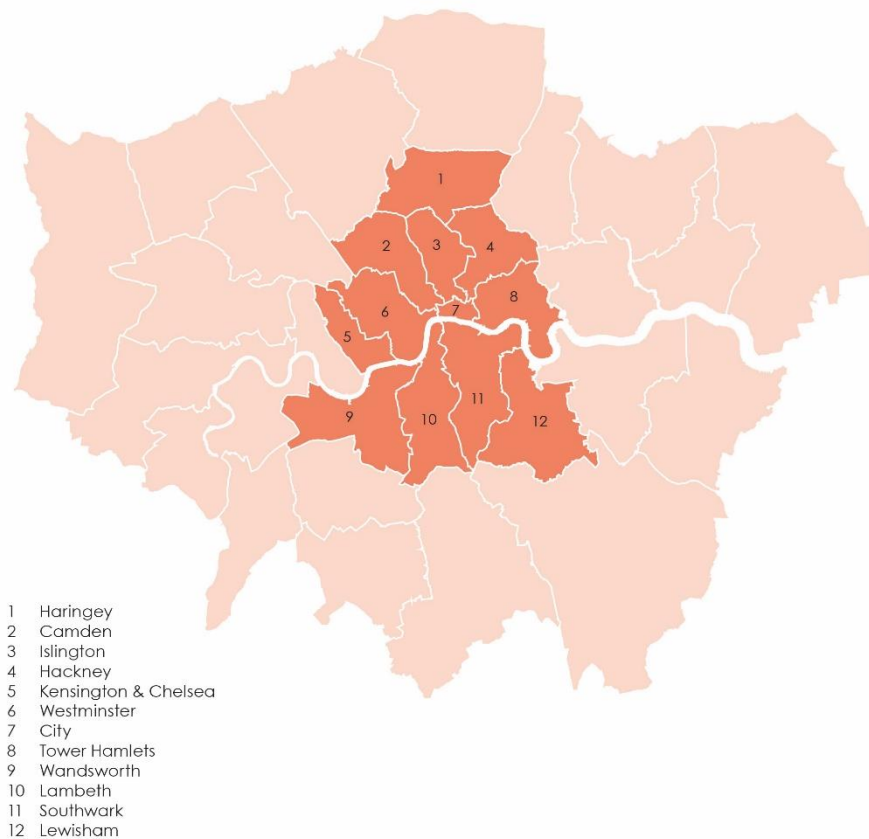
A disaggregation of the work between public and private suggests that approximately **60% of the labour demand will be required for interventions on domestic properties**, and around **40% for non-domestic properties**. Interventions on owner-occupied and private rentals account for the largest share of domestic interventions with social rented properties accounting for 15% of the total domestic labour demand. Retrofit of private commercial properties account for 83% of the labour demand in non-domestic properties with balance (17%) in public non-residential properties. A detailed breakdown of the data for each borough accompanies this report.

The low carbon retrofit labour demand exists in the context of a wider London construction industry. To assess the impact of this we have compared the low carbon retrofit workforce in the CLF boroughs with the wider construction workforce in Greater London. **Between 2023 and 2027 low carbon retrofit works taking place in the Central London Forward boroughs have the potential to engage between 4% and 6% of the total construction workforce in relevant occupations across London.**

¹ Building envelope specialists are any trade involved with the external cladding of a building other than bricklaying, for example, curtain walling. They include SOC Code 5319 - Construction and building trades not elsewhere classified.

1. INTRODUCTION

Central London Forward (CLF) is the strategic sub-regional partnership for Central London covering the local authorities of Camden, the City of London, Hackney, Haringey, Islington, Kensington and Chelsea, Lambeth, Lewisham, Southwark, Tower Hamlets, Wandsworth and Westminster. With this research CLF aims to get a better understanding of the labour demand generated by low carbon retrofit of the domestic and non-domestic building stock to help inform future skills strategies across the partnership and within each of the member boroughs.



Within the twelve boroughs there are around 1.39 million domestic properties² and 176,000 non-domestic properties³. These properties are of varying ages, types and conditions. To meet the UK's net zero ambitions there will be a requirement to improve the energy efficiency of the existing building stock. London's buildings contribute around 76% of its greenhouse gases⁴; homes contribute around one third of London's emissions⁵. Furthermore it is estimated that around 80% of buildings which currently exist will remain by 2050⁶. The type of labour that will be required to deliver those retrofit measures will depend on the work that is required to be done on the existing stock. Energy Performance Certificates (EPCs) are a consistent means by which the energy efficiency of domestic and non-domestic building is assessed. These are available for around 63% of domestic and 55% of non-domestic properties within the CLF boroughs. They provide an assessment of the current levels of energy performance along with recommended measures which could be implemented to improve that performance. Whilst not covering 100% of properties EPCs do provide the most suitable set of data on which to base a forecast of labour demand for retrofitting

² <https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2022>

³ <https://www.gov.uk/government/statistics/non-domestic-rating-stock-of-properties-2022>

⁴ <https://www.london.gov.uk/programmes-and-strategies/environment-and-climate-change/energy/energy-buildings/london-building-stock-model>

⁵ <https://beta.londoncouncils.gov.uk/news/2021/london-housing-plan-help-achieve-net-zero-and-unlock-ps98-billion-boost-greener-future>

⁶ <https://www.jll.co.uk/en/views/to-create-net-zero-cities>

skills. The data reflects the current characteristics of the properties within a borough and the steps that might be taken to improve their performance.

WLC Ltd were commissioned to carry out research to meet CLF's aim of having an evidence base for low carbon retrofitting skills which can be used to inform future strategy and policy. The work had three strands.

- 1) Assess the low carbon labour demand for retrofit skills.
- 2) Explore potential scenarios for how that labour demand may be spread over the next 5-10 years based on potential roll out plans.
- 3) Provide an understanding of the labour demand for different types of properties such as social and private rented.

This report provides an analysis of the aggregated results for the 12 CLF boroughs along with high level findings for each of the boroughs. It is accompanied by a series of technical annexes providing more detail for each borough.

2. METHODOLOGY

The research had three stages.

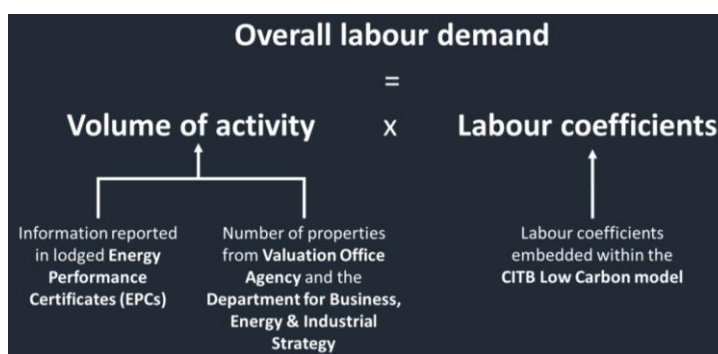
- **Stage 1:** quantify the overall labour demand associated with improving the energy performance of properties in CLF.
- **Stage 2:** develop scenarios to profile the labour demand over time based on the rate at which the interventions are delivered. These scenarios were developed through a stakeholder workshop during which CLF members had the opportunity to develop potential scenarios.
- **Stage 3:** assess the impact that these delivery scenarios could have on the regional labour requirements.

2.1. STAGE 1: QUANTIFYING THE OVERALL LABOUR DEMAND

The first stage in the analysis is to estimate the overall labour demand in person-years⁷ required to deliver the low carbon retrofit of domestic and non-domestic properties. The labour demand is a function of both the volume of activity (ie the estimated number of retrofit interventions required to improve the energy performance of properties currently below a certain EPC band) and the labour intensity of the intervention (ie how many person-years, and of which occupation, are needed to deliver each intervention).

The volume of activity was derived from the EPCs and was factored to account for the properties within each borough that do not have a certificate.

The labour intensity is defined by labour coefficients available within CITB's Low Carbon Labour Forecasting Tool. Labour coefficients describe how many person-years – broken down by occupation – are required to deliver a given intervention. Labour coefficients vary depending on the intervention, take account of the fact that delivering interventions on properties of different sizes will require a different amount of labour.



2.1.1 Sources and type of data used

The sources, type and purpose of data used to quantify the overall volume of activity are detailed in Table 1.

⁷ Person-years are defined as the number of Full Time Equivalents (FTEs) needed to deliver a given set of interventions over a one year period (e.g., 20 person-years means that 20 FTEs are needed to deliver the given amount of work over one year or, alternatively, that one FTE would need 20 years to deliver it)

Table 1: Sources and type of data used

Source	Type of data used	Purpose of the data
Energy Performance of Buildings Data: England and Wales ⁸	• Energy Performance bands • Property size • Property type • Tenure • Recommendations	Quantifying the volume of known activity by recommendations for domestic and non-domestic properties
Valuation Office Agency ⁹	Number of non-domestic properties by borough and by sector	Estimating the volume of activity for buildings which do not have an EPC
National Energy Efficiency Data Framework ¹⁰		
Council Tax Stock of properties tables ¹¹	Number of domestic properties by borough	

2.1.2 About the CITB Labour Forecasting Tool

To estimate this demand, we use the CITB Labour Forecasting Tool (LFT) which has been calibrated to accommodate specific models related to low carbon skills. The LFT creates forecasts based on the volume of activity which is the input to a series of labour coefficients. The labour coefficients are defined by the type of interventions (eg per loft insulation activity) and each of the recommendations in the EPCs were mapped to the most relevant interventions as shown in the table below. The data underlying this was used in [CITB's Building Skills for Net Zero, 2021 report](#).

Table 2: List of interventions

Intervention category	Intervention
Insulation	Loft insulation
	Cavity wall insulation
	Low rise external solid wall insulation
	Internal solid wall insulation
	Solid floor insulation
	Suspended floor insulation
Glazing	Glazing retrofit
Heating	Boiler installation
	Direct electric heating
	Ground source heat pump
	Air source heat pump
	Heat networks
PV	Onsite generation via PV
Smart systems	Smart Systems - domestic
Solar thermal	Solar thermal panels

The analysis was limited to the 28 construction-related occupational groups within the CITB footprint, as presented in Appendix A. The analysis did not assess the softer skills required for retrofit such as raising awareness, upskilling existing workforce. It only considered at the number of people required to deliver energy improvement interventions.

2.1.3 Assumptions

Assumptions were made as part of the analysis to fill the gaps in available data and to avoid double counting. These assumptions are as follows.

⁸ <https://epc.opendatacommunities.org>

⁹ <https://www.gov.uk/government/statistics/non-domestic-rating-stock-of-properties-2022>

¹⁰ <https://www.gov.uk/government/collections/non-domestic-national-energy-efficiency-data-framework-nd-need>

¹¹ <https://www.gov.uk/government/statistics/council-tax-stock-of-properties-2022>

- EPCs have a validity period of 10 years. During that period, upgrading work may have been undertaken to properties without an updated EPC being prepared. Thus older EPCs might not reflect the current energy performance of those properties. To accommodate this, we have only considered EPCs lodged on or after 2013 in quantifying the volume of activity.
- Where more than one EPC has been lodged between 2013 and 2023 for the same property, the most recent EPC has been used.
- The distribution of the types of recommendations for properties which do not have an EPC within the last 10 years is assumed to be the same as for properties with a valid EPC.
- Estimates of labour demand for buildings which do not have a current EPC were based on the assumption that these follow the same types of measures as properties which do have an EPC.
- The labour demand has been prepared based on the recommendations noted in the EPCs. Although implementing these recommendations will not necessarily mean that properties to reach a specific EPC band (eg C) across the board, it is assumed that the work being proposed will lead to improved energy efficiency and therefore reduce the carbon emissions from buildings.
- The analysis relied on the availability of labour coefficients within the CITB Low Carbon model. Some relatively minor recommendations (eg replacing light fittings; boiler insulations) are not covered by the model because of the low levels of construction labour required. Such recommendations are therefore excluded from the analysis.
- The modelling is based on retrofit rather than rebuild. It assumes that the recommendations in EPCs are fully implemented and does not take account of any potential demolition and rebuild¹². In some cases redevelopment may be a preferable option to improve energy efficiency. It is beyond the scope of this research to assess which buildings might be redeveloped rather than retrofitted on a case-by-case basis. It has therefore been assumed that all retrofit measures are implemented.
- It is assumed that the recommendations listed can be implemented and that there are no restrictions on planning (for instance in conservation areas which may be particularly prevalent in some of the boroughs).
- Labour demand only covers the construction retrofit activity. No maintenance activity or future replacement of retrofitted properties is taken into account.
- It is assumed that there is no retrofit activity required on properties newly built from 2023 onwards and that these already have a high level of energy efficiency.

2.2. STAGE 2: DEVELOPING SCENARIOS FOR THE PROFILING OF THE LABOUR DEMAND OVER TIME

The second stage of the analysis developed a series of potential scenarios showing how interventions could be rolled out and the impact that different roll out scenarios could have on the labour demand profile over time. Scenarios were developed collaboratively with CLF stakeholders who attended an online workshop on 20 July 2023 facilitated by members of the WLC Ltd team. Attendees at the workshop created a series of plausible potential delivery roll out rates by assigning assumptions to the following set of variables.

- **EPC banding:** to decide which properties should be included in the analysis based on their current EPC band. This allows recommendations to be addressed on certain buildings at different points in time (eg poorer energy performing building at an early stage).
- **Property type:** to decide whether the delivery profile should depend on the property type or not. Stakeholders could distinguish between domestic and non-domestic properties.
- **Property tenure/sub-type:** to decide whether the delivery profile for domestic properties should be tenure-dependent. Stakeholders were allowed to distinguish between owner-occupied, private rental and social rental, and others¹³. Non-domestic properties were defined as private commercial and public non-housing.

¹² <https://www.londonpropertyalliance.com/retrofit-first-not-retrofit-only-a-focus-on-the-retrofit-and-redevelopment-of-20th-century-buildings/>

¹³ It includes Other/Unknown and Not defined properties

- **Intervention type:** to apply different rates to fabric-related interventions (eg loft insulation) and to system-related ones (eg installation of photovoltaic panels)
- **Timescales:** to set a timeframe for the delivery of the proposed interventions.
- **Roll out:** to define the pace at which interventions are implemented. Stakeholders could choose to apply one of the following roll outs: uniform, linearly increasing¹⁴, slow ramp-up (S-curve), and fast ramp-up (S-curve).

A list of the values which could be assigned to these variables is shown in Figure 1. Details of recommendations assigned to fabric-related and system-related are shown in Table 3.

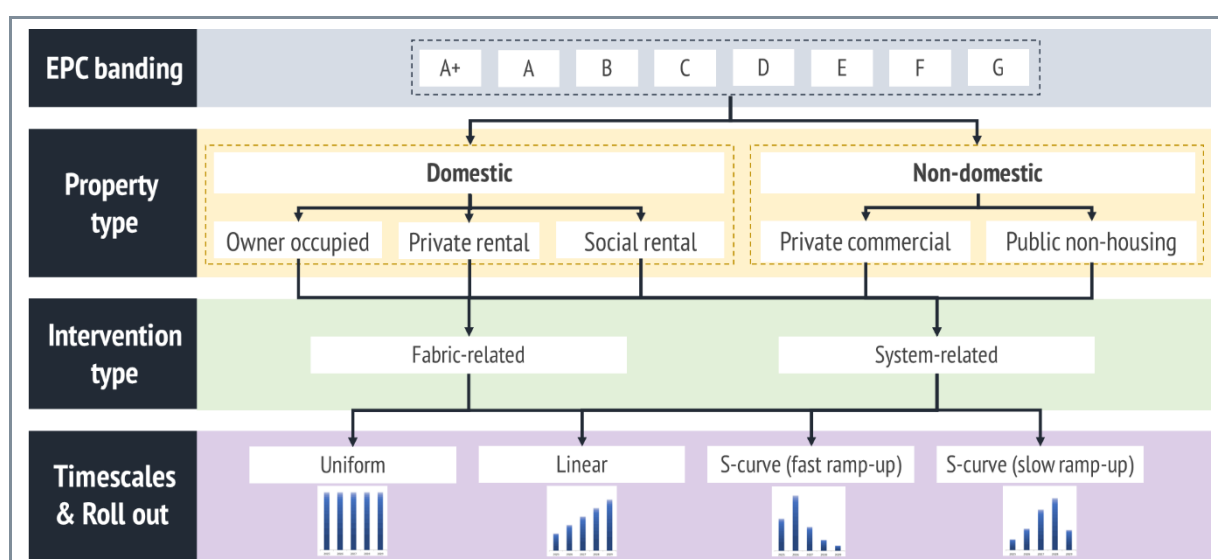


Figure 1: Variables used to define the potential scenarios

Table 3: Interventions for which labour demand has been estimated

Fabric-related interventions	System-related interventions
Loft insulation retrofit	Boiler retrofit installation
Cavity wall insulation retrofit	Onsite generation via PV retrofit
Low rise external solid wall insulation retrofit	Solar thermal panels retrofit
High rise cladding retrofit	Installation of ground source heat pumps
Internal solid wall insulation	Installation of air source heat pumps
Solid floor insulation retrofit	Direct electric heating
Suspended floor insulation retrofit	Installation of smart systems for heat control
Glazing retrofit	

The views of stakeholders were gathered from the workshop and were used by the WLC Ltd team to prepare four scenarios. These were circulated to the workshop attendees for approval. Following that consultation, a fifth scenario was also developed to accommodate additional inputs.

2.3. STAGE 3: ASSESSING THE IMPACT OF ROLL OUT RATES

The final stage of the labour assessment was to explore the impact that the scenarios developed as part of stage 2 could have on the Greater London Region construction labour requirements. As part of Stage 3, the average 2023-2027 EPC-related labour demand – expressed as a percentage of the average labour demand in London over the same period – was calculated for each scenario.

¹⁴ For a linearly increasing rate we have assumed that 10% of the workforce over the time at which the rollout is increasing is employed in the first year.

3. ENERGY PERFORMANCE OF THE EXISTING BUILDING STOCK

This section describes the energy performance of properties in the Central London Forward boroughs. Results are based on an analysis of EPCs lodged between the start of 2013 and the end of 2022.

3.1. CENTRAL LONDON FORWARD IN THE WIDER REGIONAL CONTEXT

Figure 2 and Figure 3 compare the performance of domestic and non-domestic properties respectively within the CLF boroughs for which an EPC certificate has been lodged in the last ten years compared to that of properties in the London region as well as across England.

They show that:

- Domestic properties in the CLF boroughs have a better energy performance compared to London as a whole. Over 56% of the domestic properties in the CLF boroughs are banded C or above compared with 50% across London and 45% across England.
- Non-domestic properties in the CLF boroughs have a poorer energy performance compared to those beyond the CLF boundaries: some 43% of the non-domestic properties in the CLF boroughs are banded C or above compared to regional and national percentages of around 50% and 49%, respectively. The overall performance of non-domestic buildings in the CLF boroughs is skewed by the high proportion of properties banded F and G (11% in the CLF boroughs compared to a London and England figure of 6 or 7%).

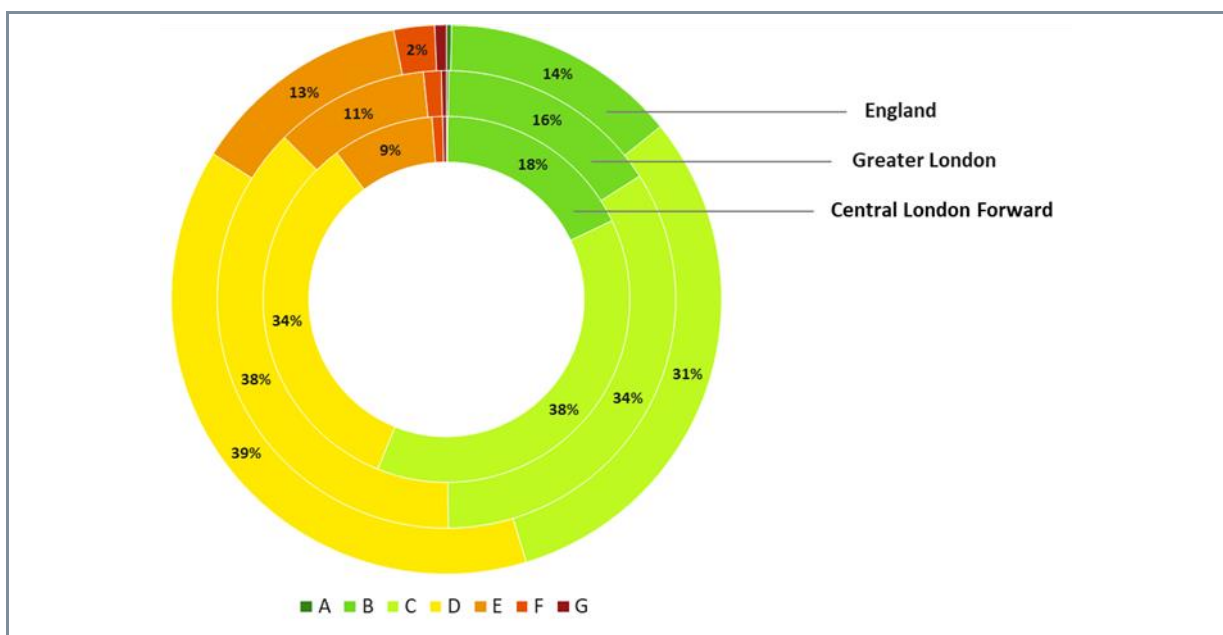


Figure 2: Domestic EPC bands

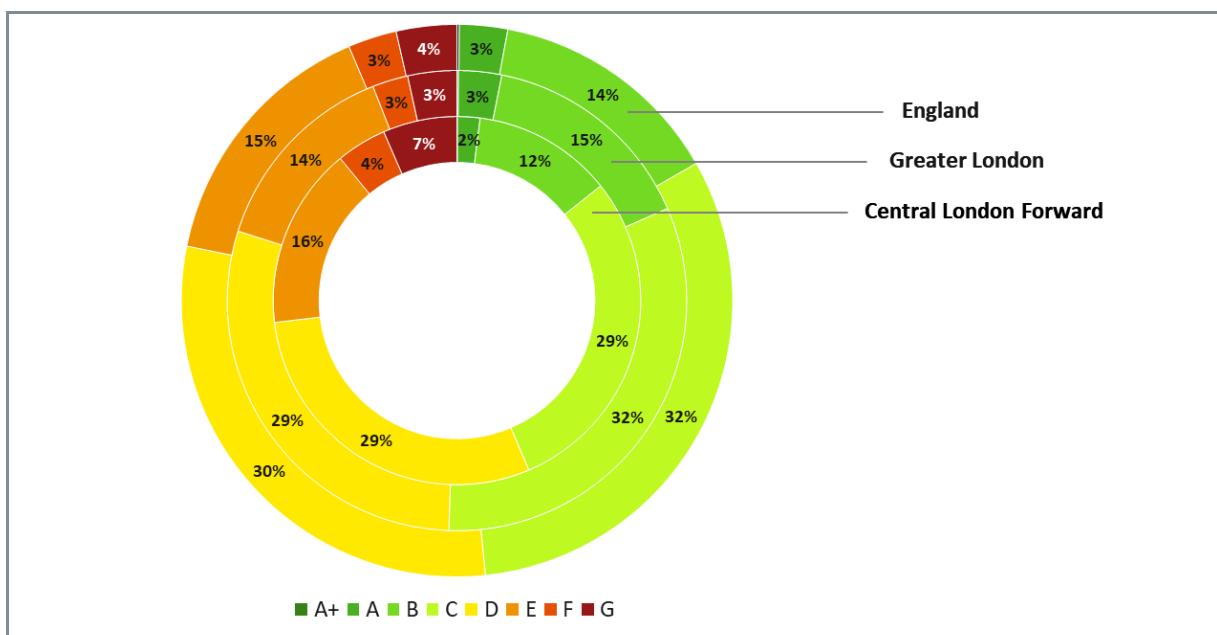


Figure 3: Non-domestic EPC bands

3.2. CENTRAL LONDON FORWARD

Figure 4 and Figure 5 show the energy performance of domestic and non-domestic properties in the boroughs within Central London Forward.

Among domestic properties, those in Tower Hamlets and City of London appear to have a better energy performance when compared to the other boroughs. Over 68% of properties in City of London and 76% in Tower Hamlets have an EPC band of C or above compared to a Central London Forward average of 56%. Haringey is the borough with the lowest percentage of recorded EPCs scoring C or above (43%).

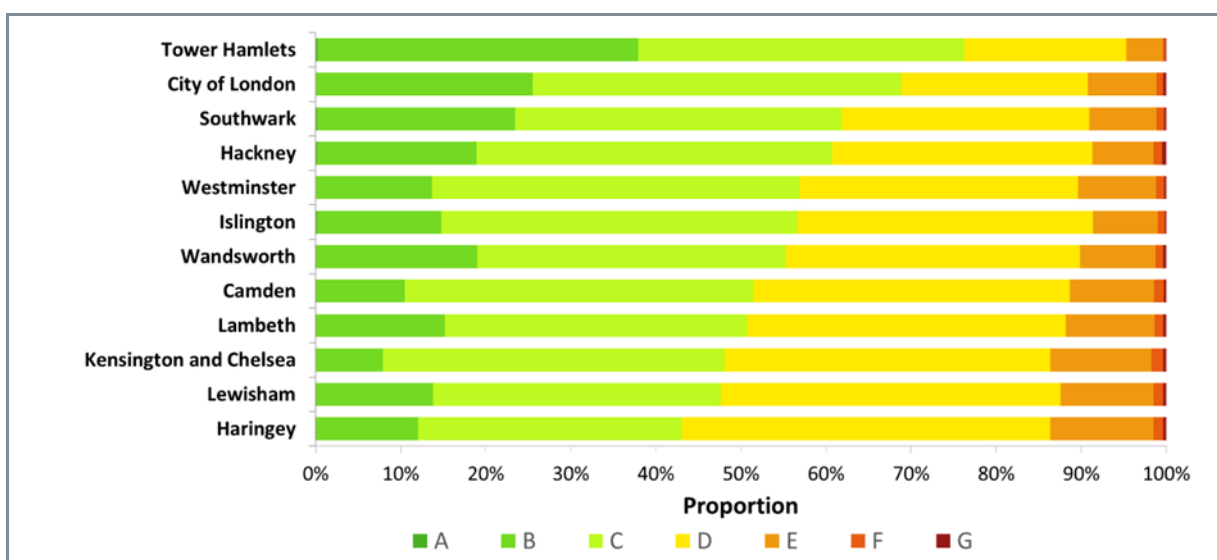


Figure 4: Domestic EPC bands by borough

Approximately 44% of the non-domestic properties with an EPC lodged in the last ten years in Central London Forward are banded C and above. The boroughs with the highest percentages are Islington (48%) and Hackney (47%). The borough with the lowest percentage of non-domestic properties banded C or above is Kensington and Chelsea (40%) whose breakdown is skewed by the high percentage of properties banded G (10% versus a CLF boroughs average of 6.5%).

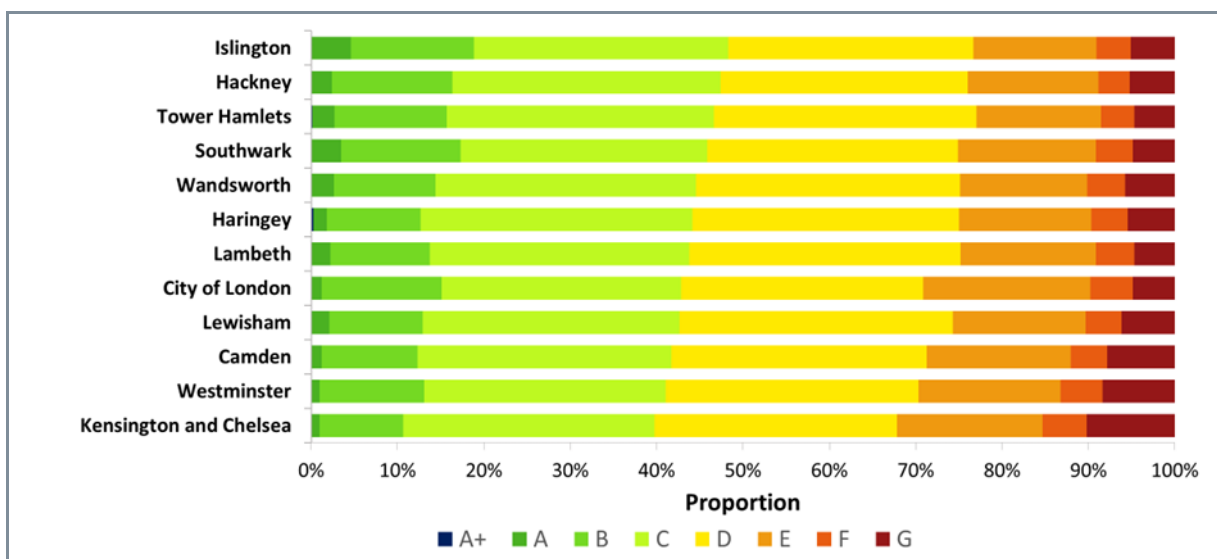


Figure 5: Non-domestic EPC bands by borough

4. QUANTIFYING THE VOLUME OF ACTIVITY

As described in section 2.1, the volume of activity was estimated from the recommendations made in EPCs. These recommendations were mapped to the interventions in the CITB Low Carbon model. In total there were 1.91 million interventions: 1.67 million on domestic EPCs and 240,000 on non-domestic EPCs.

Details of the type and number of interventions at borough-level are provided in Figure 6 (domestic properties) and Figure 7 (non-domestic properties).

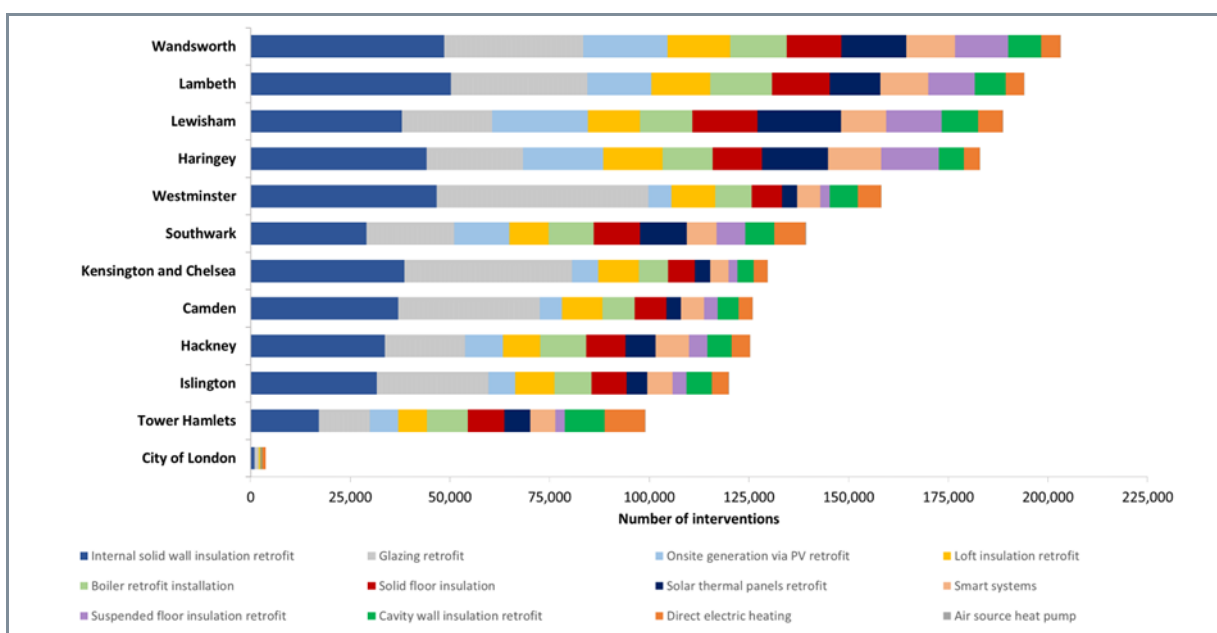


Figure 6: Domestic EPC interventions by borough

The top two interventions on domestic properties are fabric-related: i) internal solid wall insulation and ii) glazing retrofit. Alone, these two items account for over 44% of the interventions for domestic buildings.

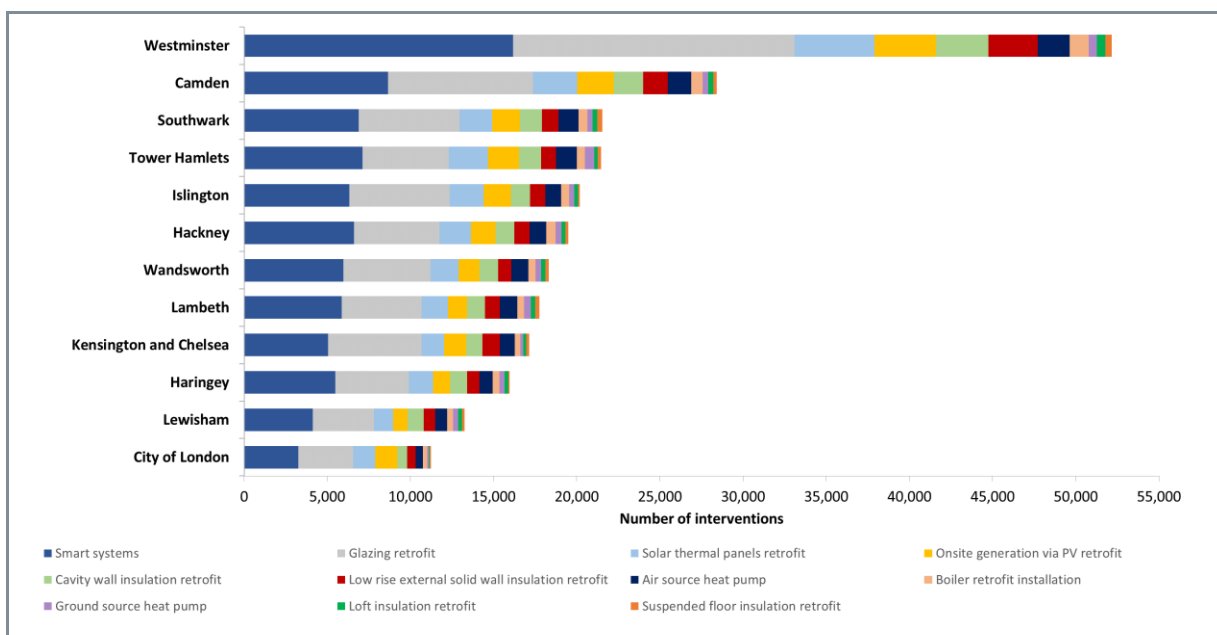


Figure 7: Non-domestic EPC interventions by borough

Among non-domestic buildings, the highest number of interventions is for the installation of smart systems along with glazing retrofit.

Analysis of interventions recommended for domestic properties by tenure is shown in Table 4. This indicates that nearly 80% of the interventions relate to owner-occupied and privately rented properties. Government data on dwellings¹⁵ indicate that in the CLF boroughs approximately 70% of the 1.39 million or so domestic properties are within the private sector.

¹⁵ Table LT 100 available at <https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants>

Table 4: Domestic EPC interventions by tenure

Intervention	Owner-occupied	Private rental	Social rental	Other ¹⁶	Total
Internal solid wall insulation retrofit	10.0%	10.3%	4.2%	0.4%	24.9%
Glazing retrofit	8.2%	7.9%	3.4%	0.4%	19.8%
Onsite generation via PV retrofit	4.7%	1.9%	1.3%	0.3%	8.2%
Loft insulation retrofit	3.3%	2.9%	1.3%	0.1%	7.6%
Boiler retrofit installation	3.1%	2.6%	1.5%	0.1%	7.3%
Solid floor insulation	2.8%	2.2%	1.9%	0.1%	7.1%
Solar thermal panels retrofit	3.5%	1.6%	1.2%	0.3%	6.5%
Smart systems	2.5%	2.4%	0.6%	0.1%	5.6%
Suspended floor insulation retrofit	2.5%	1.6%	0.6%	<0.1%	4.8%
Cavity wall insulation retrofit	1.5%	1.5%	1.6%	0.1%	4.6%
Direct electric heating	1.1%	2.0%	0.4%	<0.1%	3.6%
Air source heat pump	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
Total	43.2%	36.9%	18.0%	1.9%	100%

We estimate that approximately 63% of domestic properties in the CLF boroughs had an EPC between 2013 and 2022 and are therefore included in the data. This share is skewed by private sector properties for which 72% had an EPC lodged compared with only 39% of social housing properties.

Figure 8 shows the share of interventions in the CLF boroughs compared to London broken down by intervention type for domestic properties.¹⁷ The figure shows the percentage of interventions to be delivered within and beyond the Central London Forward area (ie in the rest of London).

Over 50% of the glazing retrofit interventions recommended for domestic buildings in London is expected to be delivered within the CLF boroughs. Conversely, less than 15% of the recommended installations of air source heat pumps (ASHP) is likely to be delivered within the Boroughs.

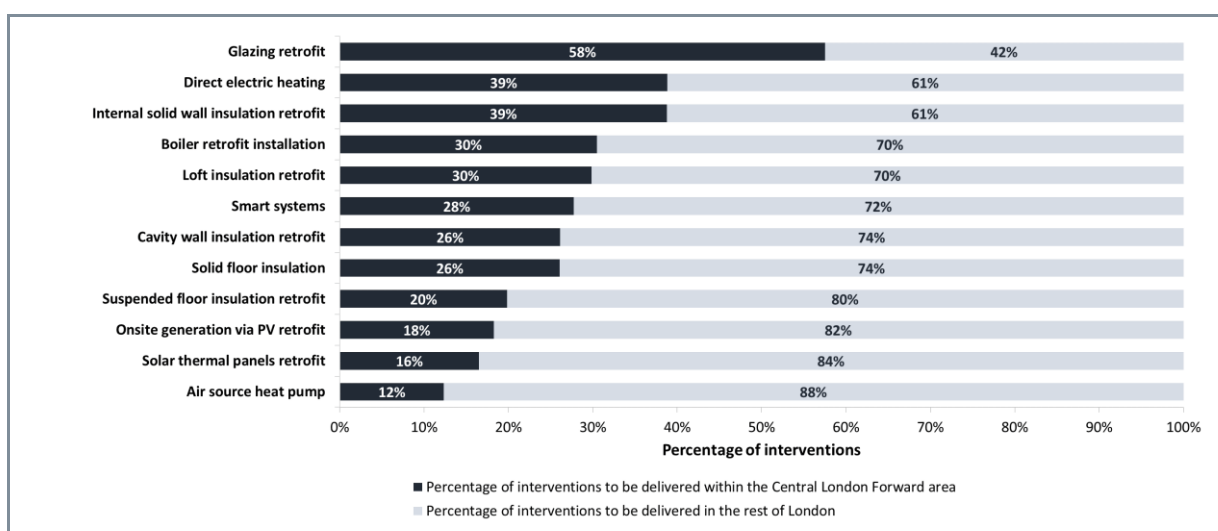


Figure 8: Domestic EPC interventions in the CLF boroughs and Greater London

¹⁶ Includes Other/Unknown and Not defined

¹⁷ Analysis based on EPCs lodged between 2013 and 2022.

Figure 9 shows the Central London Forward regional share of interventions broken down by intervention type for non-domestic properties.¹⁸ The figure shows the percentage of interventions to be delivered within and beyond the Central London Forward area.

Interventions on non-domestic properties in the CLF boroughs are likely to account for approximately 45% of all the interventions on this type of buildings across the Great London Region. A study carried out by the Skills for Sustainable Skyline Taskforce has recently published findings which look specifically at the commercial sector in the same 12 boroughs as CLF¹⁹.

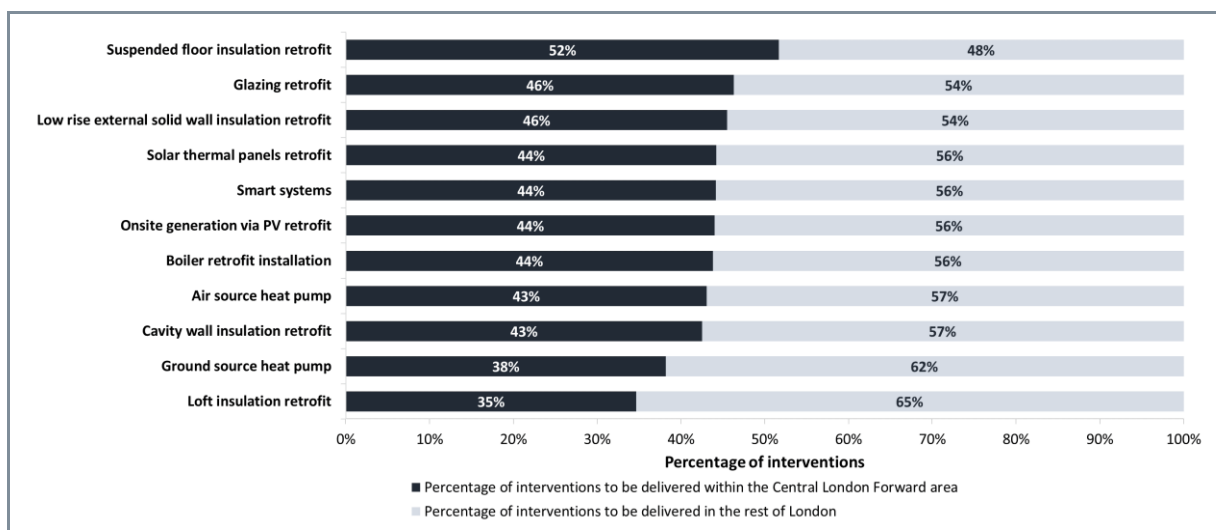


Figure 9: Non-domestic EPC interventions in the CLF boroughs and Greater London

5. LOW CARBON LABOUR DEMAND

This section presents an overview of the total labour demand (ie person-years) required to improve the energy performance of the property stock in the CLF boroughs. This does not consider the rate at which interventions might be implemented.

We have estimated that approximately 163,000 person-years are required to implement the interventions across all bands of EPCs. This has been factored to account for the properties which do not have a current EPC. Figure 10 shows the distribution of labour demand required to deliver interventions based on the EPC bands. The labour demand to deliver interventions for properties banded D and below accounts for around 102,000 person-years; if band C is included then this increases by around 45% to 148,000 person-years. Intervention in bands A+ to B account for only 15,000 person-years.

¹⁸ Analysis based on EPCs lodged between 2013 and 2022.

¹⁹ <https://www.cityoflondon.gov.uk/supporting-businesses/business-support-and-advice/skills-for-a-sustainable-skyline-taskforce/skyline-skills-recommendations-report>

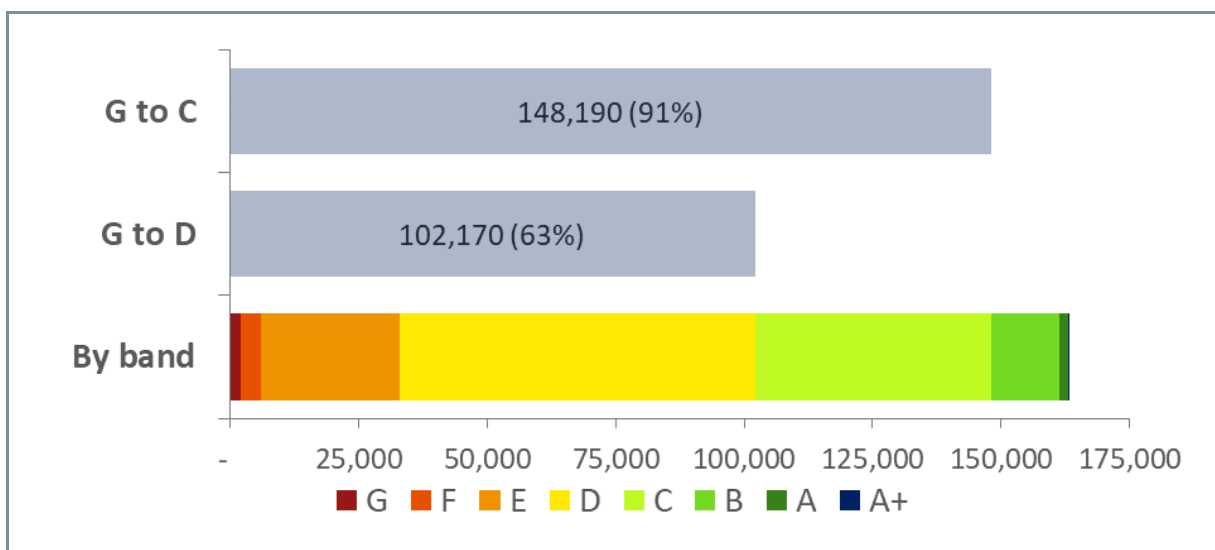


Figure 10: Labour demand to deliver interventions in different ranges of EPC bands

The following sections provide details on the total labour broken down by:

- geographic location at a Borough level;
- property type;
- intervention; and
- occupation.

A further analysis of the labour demand for domestic properties by tenure is provided in section 5.5.

5.1. BREAKDOWN BY BOROUGH

A Borough-level breakdown of the total labour demand is shown in Figure 11.

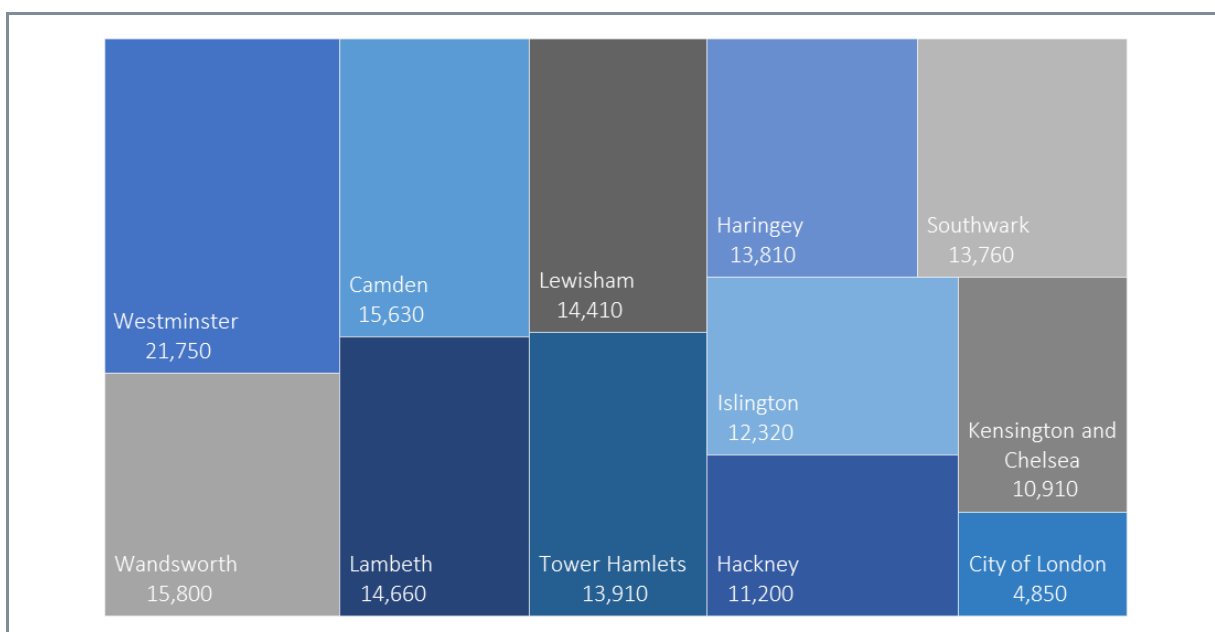


Figure 11: Total low carbon labour demand in person-years by borough

Westminster, Wandsworth and Camden have the highest overall labour demand, partly reflecting the fact that they are recording the highest number of non-domestic and domestic interventions (see Figure 6 and Figure 7). Together, they account for around 33%²⁰ of the overall 163,000 person-years labour demand.

5.2. BREAKDOWN BY PROPERTY TYPE

Our analysis indicates that across the CLF boroughs approximately 60% of the labour demand will be required for interventions on domestic properties, and less than 40% for non-domestic properties. Non-domestic properties have a larger share of labour demand than the absolute number of properties because they tend to have a larger floor area.

Figure 12 shows that there will be CLF boroughs whose low carbon labour demand is skewed toward the domestic sector (eg Lewisham, Haringey, Wandsworth), and some in which demand will be driven by interventions on non-domestic properties (eg City of London, Tower Hamlets).

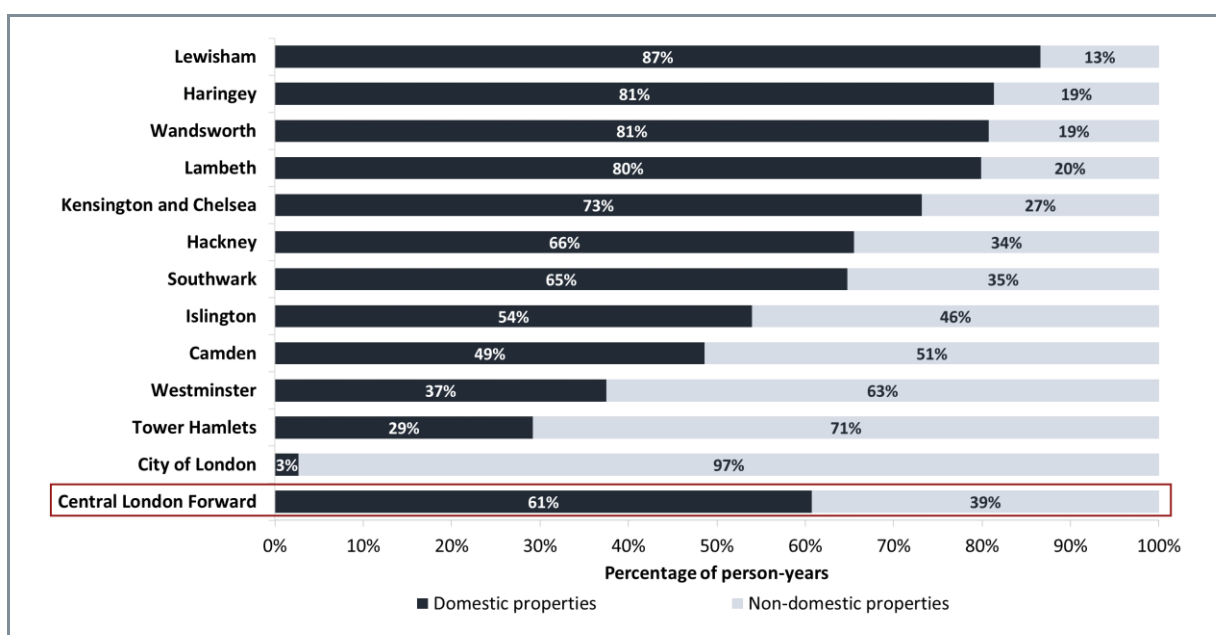


Figure 12: Low carbon labour demand for domestic and non-domestic buildings by borough

5.3. BREAKDOWN BY INTERVENTION

A breakdown of the total labour demand by intervention is shown in Figure 13 for the CLF boroughs and in Figure 14 for each borough. While differences exist between boroughs, the analysis shows that there are three core interventions whose delivery is going to require a significant portion of the total labour demand in CLF boroughs. As shown in Figure 13, internal solid wall insulation and the installation of solar thermal panels and PVs (combined) account for approximately 64% of the total low carbon labour demand. At a borough-level, this percentage varies between 60% (Camden) and 68% (Wandsworth).

²⁰ Westminster accounts for 13% of the total person-years. Wandsworth and Camden each account for 10% of the total demand.

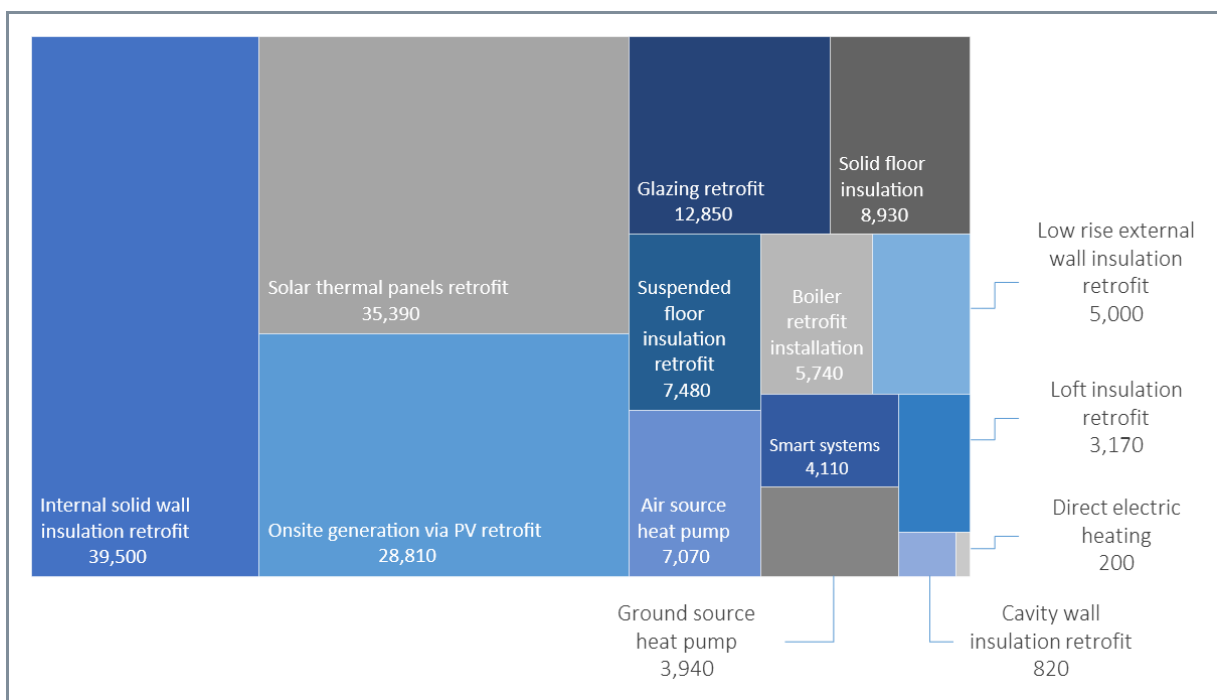


Figure 13: Low carbon labour demand in person-years by intervention

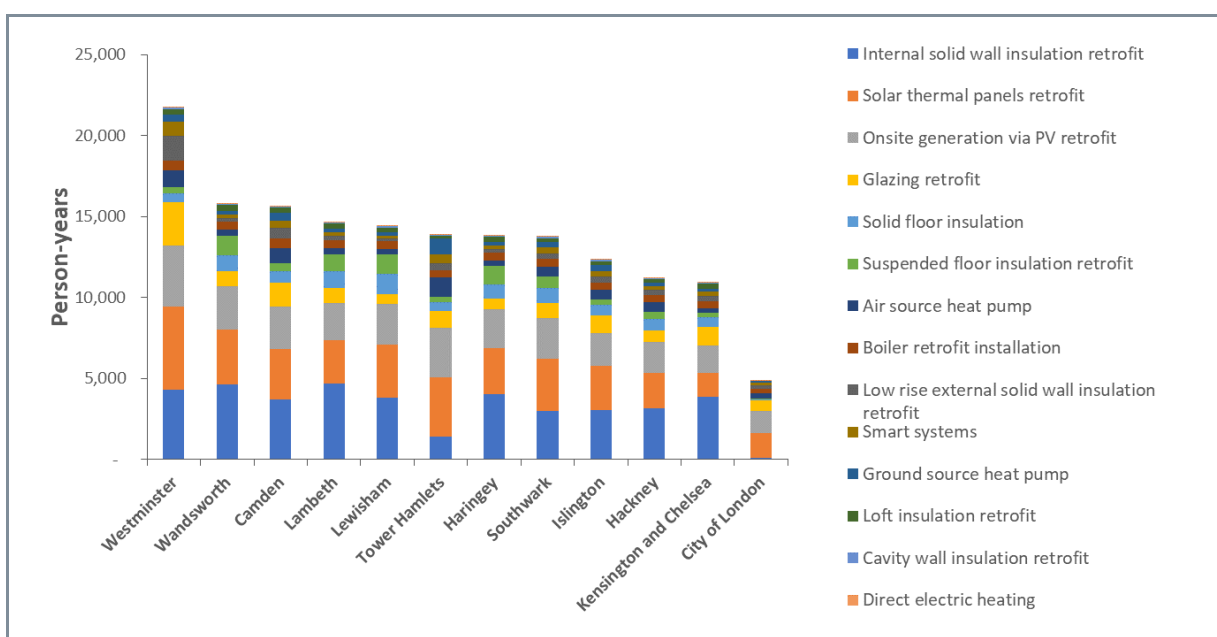


Figure 14: Low carbon labour demand by intervention and borough

5.4. BREAKDOWN BY OCCUPATION

A breakdown of the labour demand forecast by occupation for the CLF boroughs is shown in Figure 15. The analysis shows that a significant portion of the total labour demand will be for five occupational groups: building envelope specialists²¹, plumbing and HVAC trades, construction trades supervisors, scaffolders, and roofers. Combined, these five occupations are expected to account for approximately 62% of the low carbon labour demand. At a borough-level, this percentage varies between 57% in Tower Hamlets and 65% in Kensington and Chelsea.

²¹ Building envelope specialists are any trade involved with the external cladding of a building other than bricklaying, for example, curtain walling. They include SOC Code 5319 - Construction and building trades not elsewhere classified.

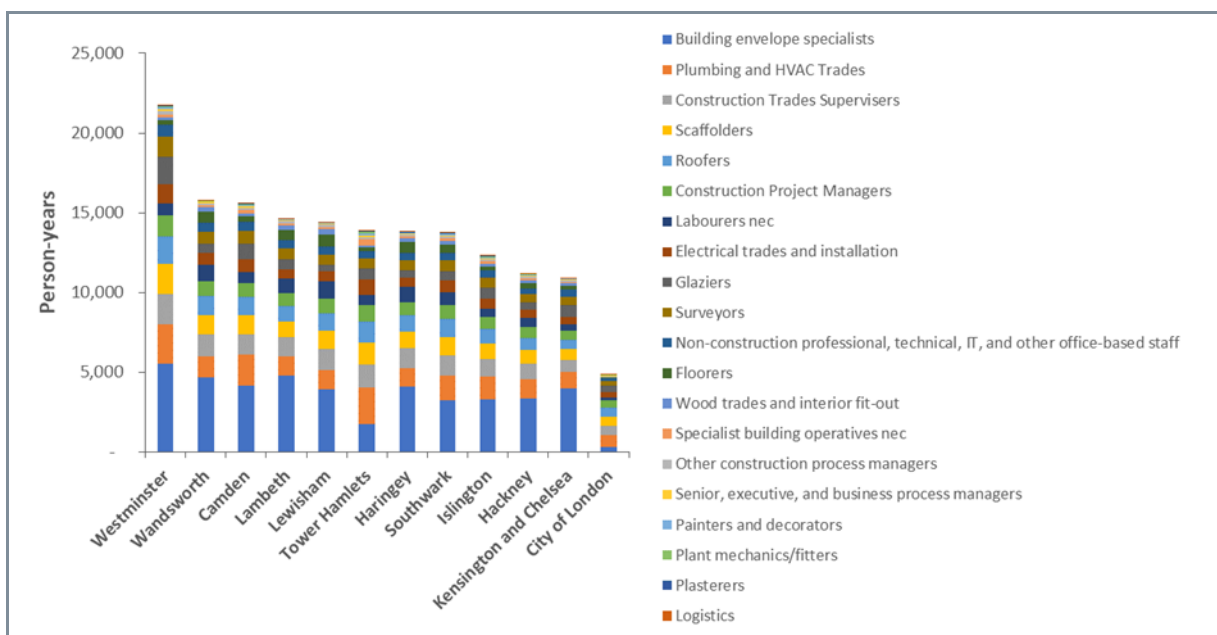


Figure 15: Low carbon labour demand by borough and occupation

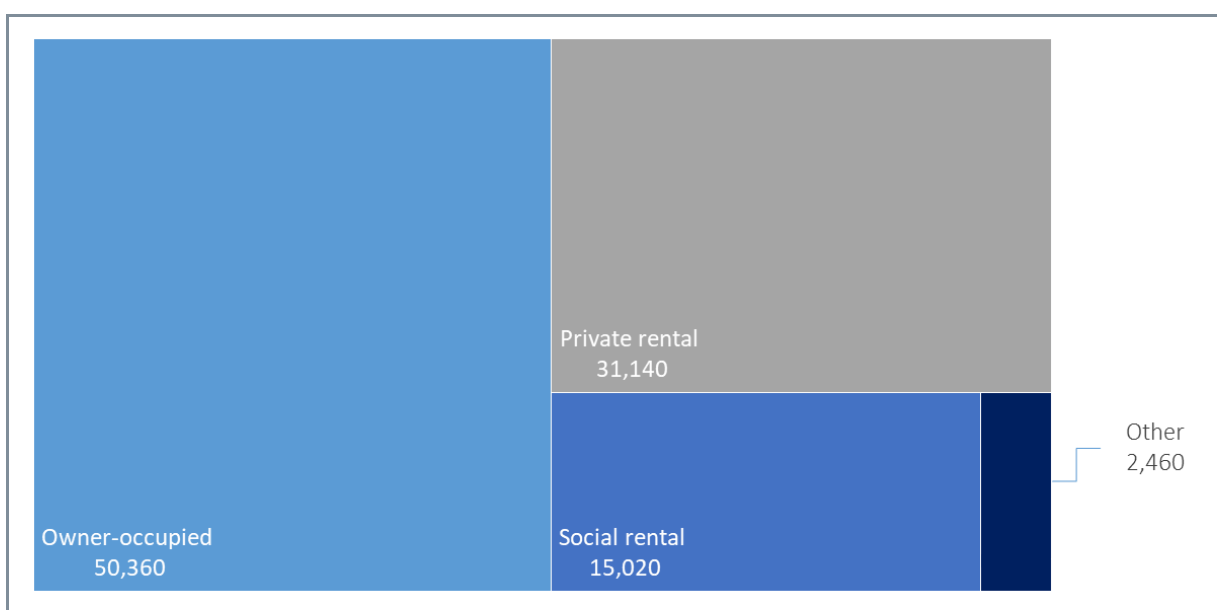
5.5. LABOUR DEMAND FOR DOMESTIC PROPERTIES

This section provides a detailed breakdown of the forecast labour demand required to retrofit domestic buildings. The deep dive was prompted by an interest from CLF in better understanding the scale of the domestic labour demand split by tenure.

The analysis considered five different categories of tenure:

- Owner-occupied
- Social rental
- Private rental
- Other²²

Figure 16 shows the total labour demand broken down by type of tenure.



²² includes EPCs listing one of the following under the tenure field: *Not defined, blank, NO DATA!, unknown*

Figure 16: Domestic low carbon labour demand in person-years by tenure

The analysis suggests that most of the domestic labour demand will be required to deliver interventions on owner-occupied properties. Owner-occupied properties account for 51% of the 99,000 person-years needed for interventions on domestic properties, and 15% will be required by social rental properties. Figure 17 shows the relative contribution of each tenure to the domestic labour demand in each of the twelve CLF boroughs. While differences exist between boroughs, in most of the cases the borough-level demand will be driven by interventions on owner-occupied properties, and only in few cases by social and private rental properties.

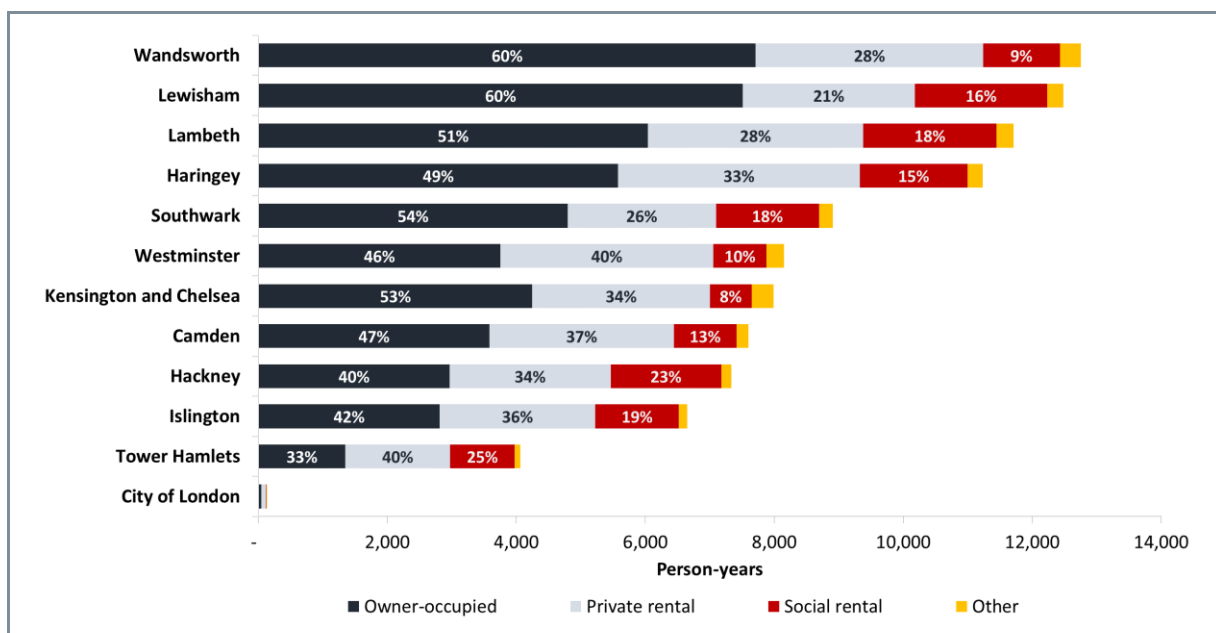


Figure 17: Domestic low carbon labour demand by borough and tenure

The analysis suggests that approximately a quarter of the domestic labour demand in Tower Hamlets and Hackney could come from social rental properties, whilst only 10% (or less) could come from this tenure in Wandsworth, Westminster, and Kensington and Chelsea.

Figure 18 provides a more detailed breakdown of the labour demand for social rented properties. This shows that Lambeth and Lewisham combined account for approximately 27% of the total low carbon retrofit workforce in social rented properties across the twelve boroughs.

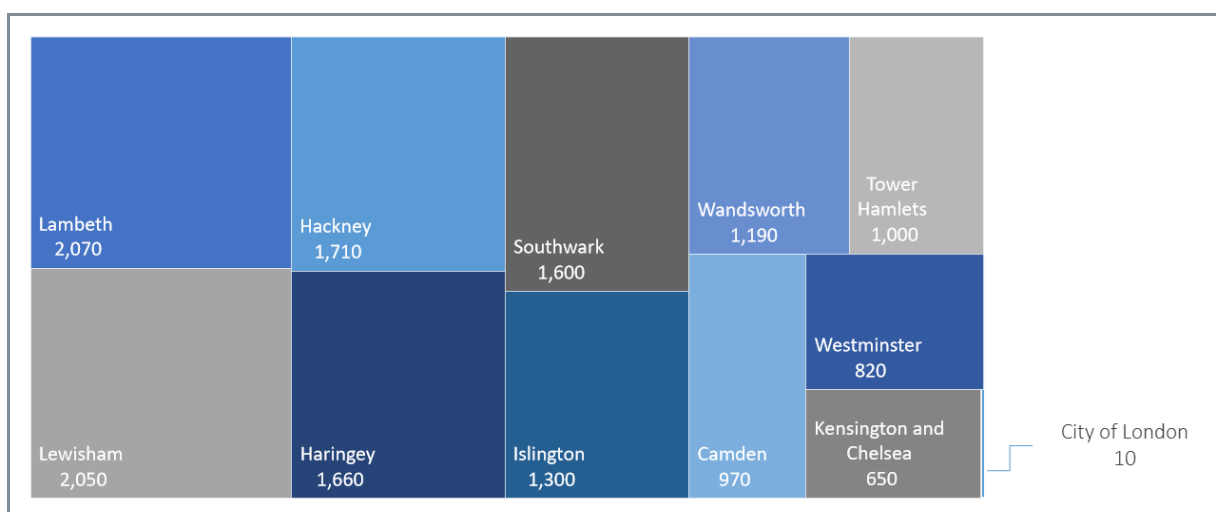


Figure 18: Domestic low carbon labour demand for social rental property by borough

5.5.1 Breakdown by intervention

Figure 19 shows a breakdown by intervention of the labour demand arising from each type of tenure. Internal solid wall insulation, and the installation of solar and PV panels are the top three intervention across all tenures accounting for between 68% (social rental) and 70% (for both private rental and owner-occupied) of the total demand.

Solid wall insulation accounts for almost 41% of the total demand arising from social rental properties compared with 49% for private rental properties and 35% for owner-occupied properties.

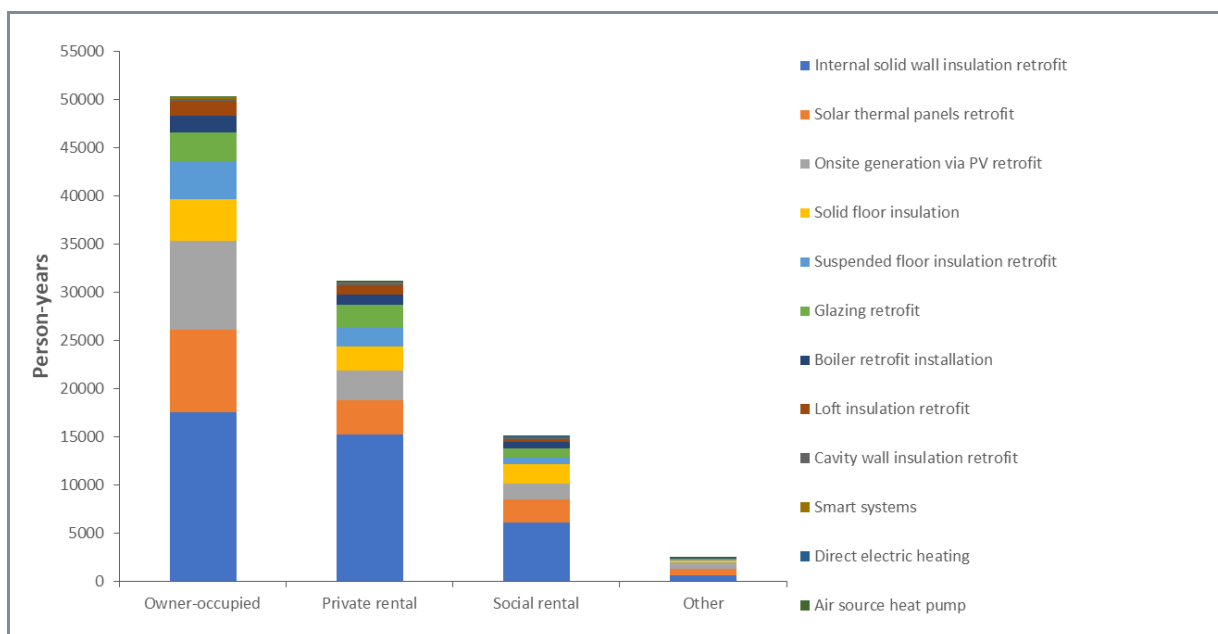


Figure 19: Domestic low carbon labour demand by tenure and intervention

5.5.2 Breakdown by occupation

Figure 20 shows a breakdown by occupation of the labour demand arising from each tenure. Building envelope specialists, construction trade supervisors, and labourers are the top three occupations across all tenures accounting for between 49% (owner-occupied) and 59% (private rental) of the total demand.

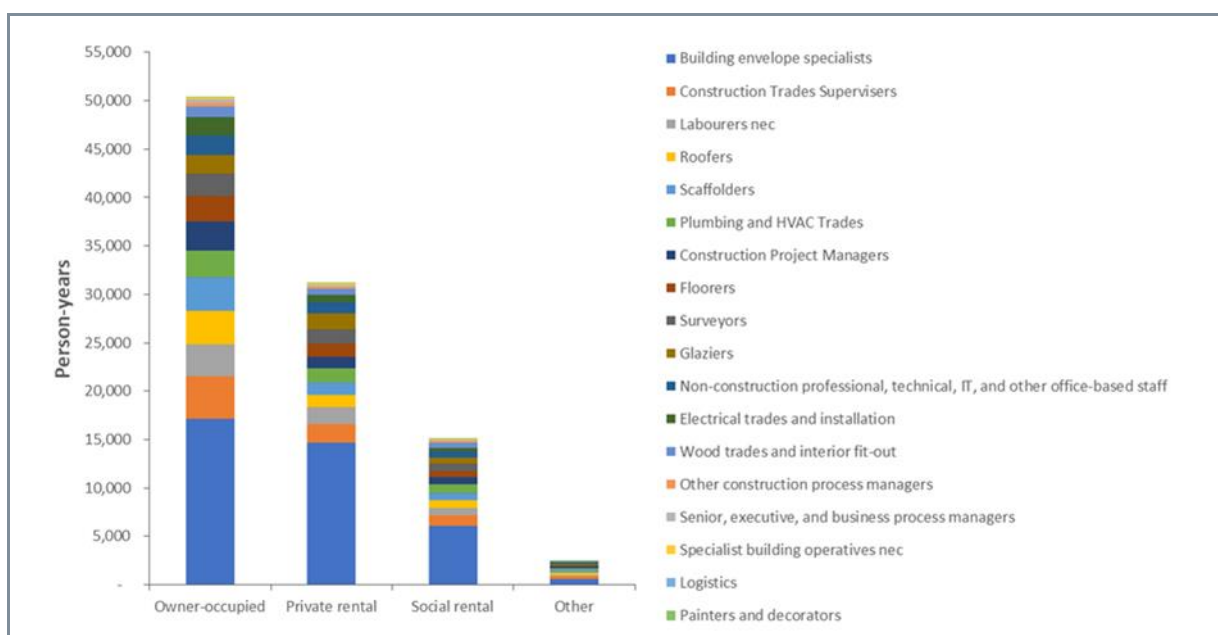


Figure 20: Domestic low carbon labour demand by tenure and occupation

Building envelope specialists – who are involved in the delivery of wall insulation retrofit measures - account for almost 40% of the total labour demand arising from social rental properties compared with 47% of that arising from private rental properties and 34% from owner-occupied properties.

Details of the occupational breakdown at a borough level forecast to be required for the delivery of interventions on the social rental housing stock are shown in Table 5.

Table 5: Occupational breakdown for social rental properties

Occupational group	Lambeth	Lewisham	Hackney	Haringey	Southwark	Islington	Wandsworth	Tower Hamlets	Camden	Westminster	Kensington and Chelsea	City of London	Total
Building envelope specialists	850	650	790	530	530	610	460	350	490	440	350	<10	6,050
Construction trades supervisors	140	190	110	160	140	80	90	80	50	40	30	<10	1,090
Plumbing and HVAC Trades	140	100	110	90	110	70	70	90	40	30	30	<10	880
Roofers	100	150	80	130	110	50	60	50	30	20	10	<10	790
Scaffolders	100	150	80	130	110	50	60	50	30	20	10	<10	790
Labourers nec ²³	100	120	70	110	90	50	70	60	40	30	20	<10	770
Construction Project Managers	100	130	80	110	100	50	60	50	30	20	20	<10	740
Surveyors	100	100	80	70	80	70	60	50	50	40	40	<10	730
Glaziers	80	70	60	40	60	70	50	30	70	60	50	<10	660
Floorers	90	110	60	90	70	50	60	50	30	30	20	<10	650
Non-construction professional, technical, IT, and other office-based staff	80	80	70	60	60	60	50	40	50	40	30	<10	630
Wood trades and interior fit-out	70	80	60	50	60	50	50	50	30	20	20	<10	540
Electrical trades and installation	50	70	40	70	50	20	30	30	10	10	<10	<10	400
Other construction process managers	20	30	20	20	20	20	20	20	10	<10	<10	<10	180
Senior, executive, and business process managers	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	80
Specialist building operatives nec ²³	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	30
Logistics	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	20
Painters and decorators	<10	<10	<10	0	<10	0	<10	<10	<10	<10	<10	0	<10
Total²⁴	2,070	2,050	1,710	1,660	1,600	1,300	1,190	1,000	970	820	650	10	15,020

²³ Not elsewhere classified.²⁴ The sum might be different from the total reported due to rounding.

5.6. LABOUR DEMAND FOR NON-DOMESTIC PROPERTIES

This section provides a detailed breakdown of the forecast labour demand required to retrofit non-domestic buildings.

The analysis considered two different types of properties:

- Private commercial
- Public non-housing

Figure 21 shows the total labour demand broken down by type of properties.



Figure 21: Non-domestic low carbon labour demand in person-years by property type

The analysis suggests that most of the non-domestic labour demand will be required to deliver interventions on private commercial properties. Private commercial properties account for 83% of the 64,000 person-years of labour demand for interventions on non-domestic properties while public non-housing will account for the remaining 17%. Figure 22 shows the relative contribution of each property type to the domestic labour demand in each of the twelve CLF boroughs. While differences exist between boroughs, the main driver across all boroughs will be interventions on private commercial properties.

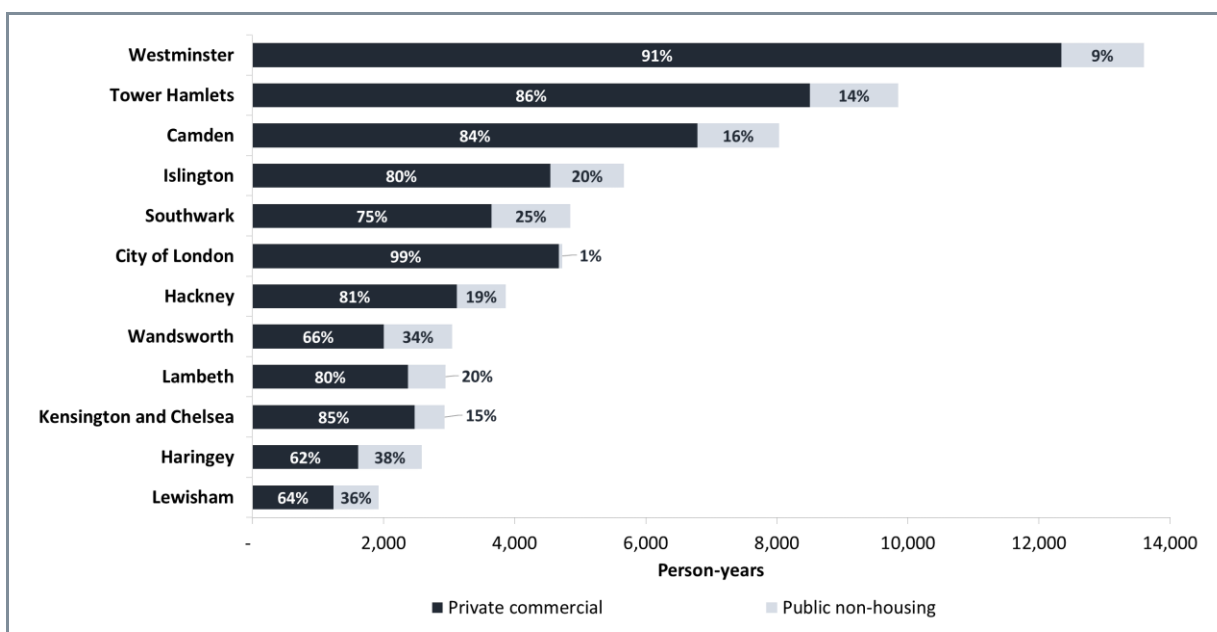


Figure 22: Non-domestic low carbon labour demand by borough and property type

The analysis suggests that over 30% of the non-domestic labour demand in Wandsworth, Lewisham and Haringey. approximately a quarter of that in Southwark could come from public non-housing, whilst only 10% or less would come from this type of properties in Westminster and City of London.

Figure 23 provides a more detailed breakdown of the labour demand for public non-housing properties. This shows that Tower Hamlets, Westminster, Camden and Southwark combined account for almost half (47%) of the total low carbon retrofit workforce in public non-housing properties across the twelve boroughs.

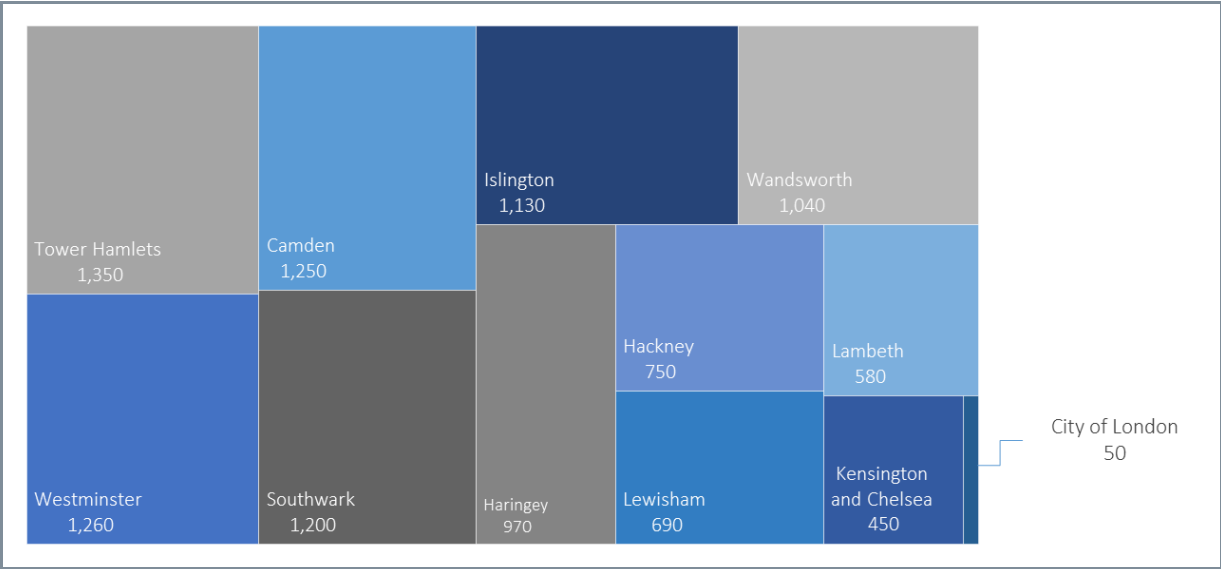


Figure 23: Non-domestic low carbon labour demand for public non-housing properties by borough

5.6.1 Breakdown by intervention

Figure 24 shows a breakdown by intervention of the labour demand arising from each type of non-domestic property type. The installation of solar panels and PV panels are the top two intervention across these property types accounting for between 51% (public non-housing) and 54% (private commercial) of the total demand.

The installation of air source heat pumps and glazing retrofit each account for almost 10% of the total demand arising from private commercial properties. The same interventions account respectively for 14% and 7% of the demand arising from public non-housing properties.

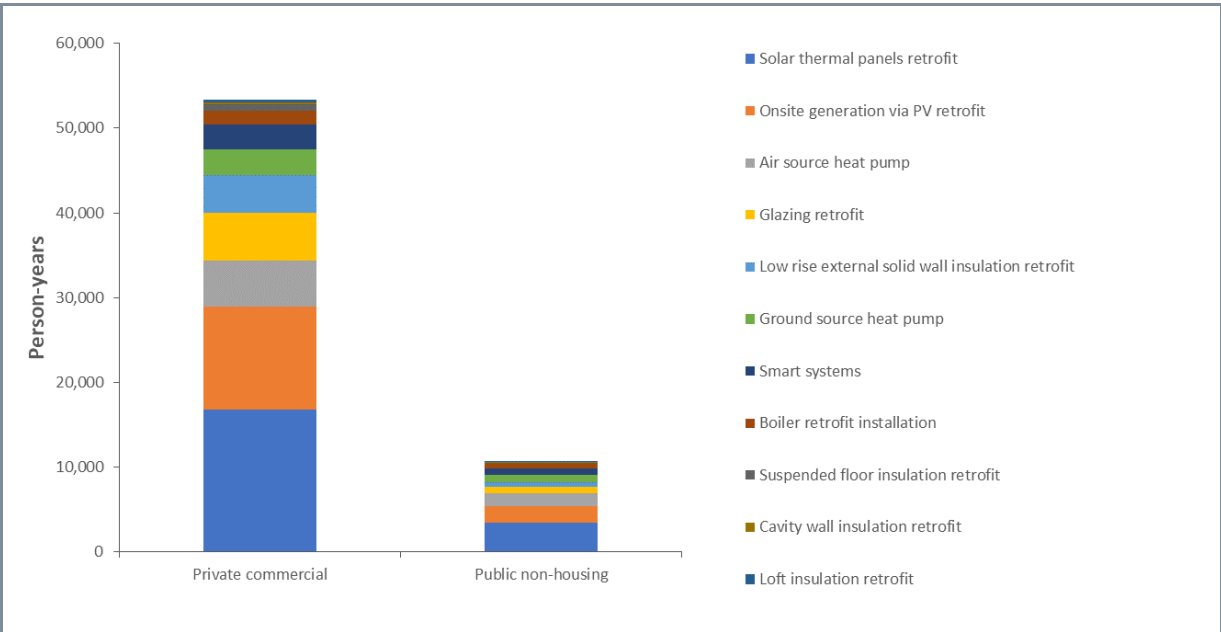


Figure 24: Non-domestic low carbon labour demand by property type and intervention

5.6.2 Breakdown by occupation

Figure 25 shows a breakdown by occupation of the labour demand arising from each property type. Plumbing and HVAC trades, scaffolders, and construction trade supervisors, are the top three occupations across all property types accounting for between 41% (private commercial) and 45% (public non-housing) of the total demand.

Plumbing and HVAC trades account for almost 18% of the total demand arising from private commercial properties. This compares with 24% for public non-housing.

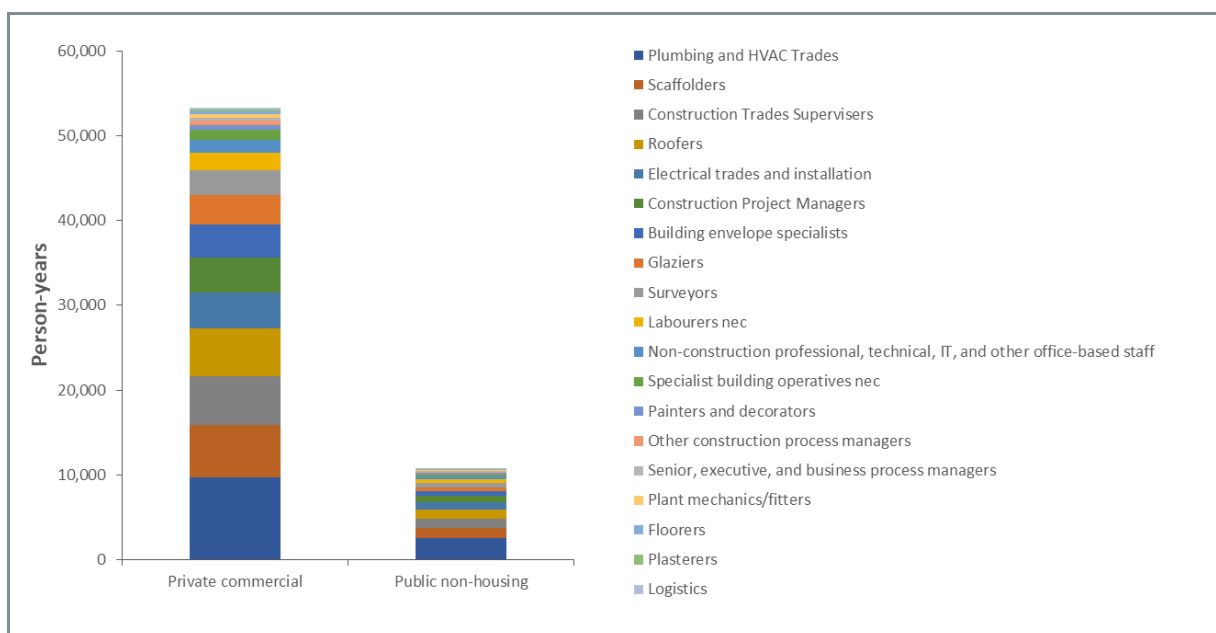


Figure 25: Non-domestic low carbon labour demand by property type and occupation

Details of the occupational breakdown at a borough level forecast to be required for the delivery of interventions on the public non-housing stock are shown in Table 6.

Table 6: Occupational breakdown for public non-housing properties

Occupational group	Tower Hamlets	Westminster	Camden	Southwark	Islington	Wandsworth	Haringey	Hackney	Lewisham	Lambeth	Kensington and Chelsea	City of London	Total
Plumbing and HVAC Trades	270	290	330	310	300	210	240	180	190	130	120	<10	2,580
Scaffolders	150	120	120	120	110	130	100	80	60	60	40	<10	1,120
Construction Trades Supervisors	160	110	120	130	120	130	100	80	70	60	40	<10	1,120
Roofers	150	100	110	120	110	130	90	80	60	60	40	<10	1,050
Electrical trades and installation	110	90	100	110	90	80	80	70	60	50	40	<10	890
Construction Project Managers	110	70	80	90	80	80	70	60	40	40	30	<10	750
Building envelope specialists	60	120	70	30	40	30	50	30	30	20	30	<10	540
Surveyors	70	70	60	60	50	50	40	40	30	30	20	<10	530
Labourers nec ²⁵	50	50	60	50	50	50	50	30	30	20	20	<10	480
Glaziers	80	80	50	50	30	30	30	20	20	20	20	<10	450
Specialist building operatives nec ²⁵	30	30	30	20	50	30	30	20	30	20	20	<10	310
Non-construction professional, technical, IT, and other office-based staff	40	30	30	30	30	30	20	20	20	10	10	<10	270
Painters and decorators	20	20	20	20	20	10	20	10	10	<10	<10	<10	160
Senior, executive, and business process managers	10	10	10	10	10	<10	10	<10	<10	<10	<10	<10	100
Plant mechanics/fitters	10	10	10	10	10	<10	10	<10	<10	<10	<10	<10	100
Other construction process managers	10	10	10	10	<10	<10	<10	<10	<10	<10	<10	<10	90
Plasterers	<10	<10	10	<10	10	<10	<10	<10	<10	<10	<10	<10	80
Floorers	<10	<10	20	<10	<10	<10	<10	<10	<10	<10	<10	-	60
Logistics	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	40
Total²⁶	1,350	1,260	1,250	1,200	1,130	1,040	970	750	690	580	450	50	10,720

²⁵ Not elsewhere classified.²⁶ The sum might be different from the total reported due to rounding.

6. RETROFIT ROLL OUT SCENARIOS

While knowing the total number of person-years required to deliver a given set of interventions is useful to understand the scale of the challenge, the speed of roll out of the interventions affects the number of people required in each year; the labour intensity. This section outlines a range of potential scenarios for the rate at which retrofit measures are implemented. They are not designed to be specific roll out plans but provide an indication of what the labour demand would be if it was delivered according to the assumptions in the scenarios. The outputs from these potential scenarios can be used to inform wider strategy development. Some of the scenarios are challenging in terms of the timescales which may mean that they are not necessarily deliverable or practical. We are not recommending one or other of these scenarios but are presenting a range of options to demonstrate the impact on labour demand. However, they demonstrate the scale of the challenge and the pace at which they must be achieved if we are to meet the overall targets. If slower rates are delivered then it increases the challenges for meeting net zero ambitions.

Five scenarios were considered as part of this commission. As described in section 2.2, these strategies were developed through stakeholder contributions gathered during the workshop and subsequent feedbacks.

- **Scenario 1a:** interventions for properties which are in EPC band D and below are delivered by 2030. Those on properties which are in other EPC bands (ie A to C for domestic properties and A+ to C for non-domestic properties) are then delivered by 2040. Interventions are rolled out at a linearly increasing rate between 2023 and 2029. A uniform roll out was assumed over the 2030-39 period.²⁷ This scenario has been developed in response to potential policies for buildings to achieve a C or higher banding by the end of the decade.

Scenario 1b: this scenario is a variation of Scenario 1a. It assumes that the delivery of interventions on C banded properties is also completed by 2030. Those on properties which are in EPC bands A+ to B are delivered by 2040. Interventions are rolled out at a linearly increasing rate between 2023 and 2029. A uniform roll out was assumed over the 2030-39 period. This scenario is in response to the Retrofit London plans for buildings to have an average of a B banding by 2030²⁸.

- **Scenario 2:** this scenario introduces a distinction based on the tenure and the type of property. It assumes that there is an increased requirement for social rented domestic properties and public non-housing buildings to address EPC C and below interventions by 2030 and other buildings for D and below by 2030. This reflects the potentially greater ease by which social rental and public properties can be targeted for interventions. Social rented domestic properties and public non-housing buildings have a fast ramp up for delivery, whilst the others have a slow ramp up. The remaining interventions are implemented over the 2030s at a uniform rate.
- **Scenario 3a:** this scenario makes the same assumption as Scenario 2 in that there is an increased requirement for social rented domestic properties and public non-housing buildings to address C and below interventions by 2030 and other buildings for D and below by 2030. However, in this scenario it is assumed that fabric interventions are carried out at a faster rate in social rented domestic properties and public non-housing buildings while systems have a slow ramp up. Both fabric and systems have a slow ramp up in other property types. The remaining interventions are implemented over the 2030s at a uniform rate. This scenario reflects the potential impacts of delivering on fabric related interventions in the first instance.
- **Scenario 3b:** this scenario is a variation of Scenario 3a. It makes the same assumptions as Scenario 3a but explores the sensitivity of the results to fabric and systems interventions assumptions. In this scenario systems have a fast ramp up and fabric have a slow ramp up in social rented and public non-housing properties.

Based on these scenarios, the average annual labour demand for low carbon labour needed to retrofit buildings in the Central London Forward sub region is shown in Table 7 for the period 2023-27.

²⁷ In all scenarios, a uniform implementation rate was applied for the skills demand modelling beyond 2030. This choice was taken to better reflect the high level of uncertainty surrounding long term forecasts.

²⁸<https://www.londoncouncils.gov.uk/our-key-themes/climate-change/retrofit-london-programme#:~:text=In%20October%202021%2C%20the%20Retrofit,B%20or%20equivalent%20by%202030.>

Table 7: Average annual labour demand over the 2023-27 period for each scenario

	Scenario 1a	Scenario 1b	Scenario 2	Scenario 3a	Scenario 3b
Number of people	13,140	19,050	17,100	16,640	16,620

The annual requirement for each scenario is analysed in the following sections.

6.1. SCENARIOS 1A AND 1B

Full details of the scenarios assumptions are shown in Figure 26.

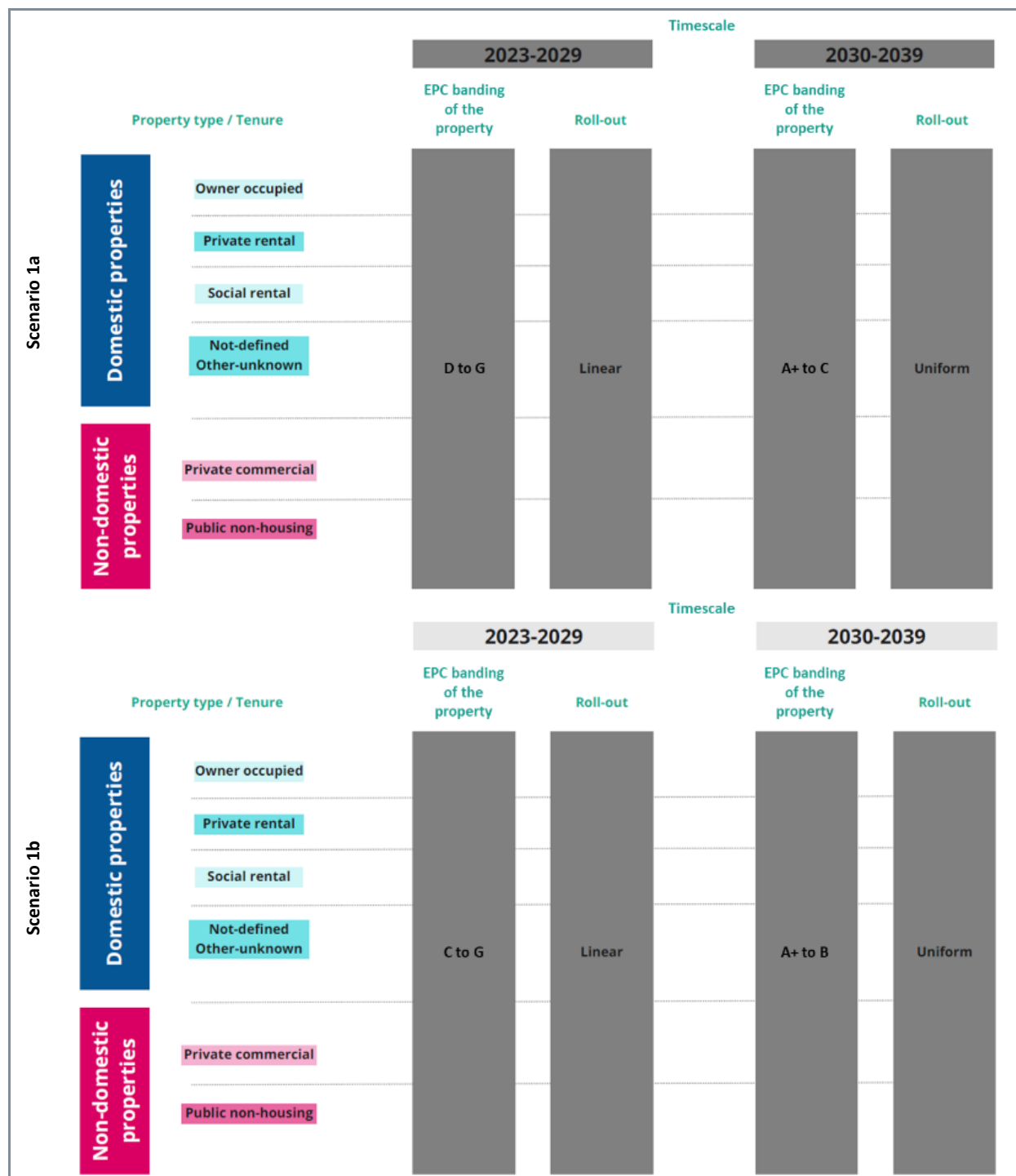


Figure 26: Modelling assumptions for Scenario 1a and Scenario 1b

Figure 27 shows the labour demand profile broken down by occupations for scenarios 1a and 1b for properties.

- **Scenario 1a:** Demand is expected to increase from 10,220 in 2023 to a peak of 18,970 people in 2029. In the 2023-27 period there is an average demand of around 13,140 people. In the 2030s an average of around 6,000 people per annum are required to implement the remaining interventions.
- **Scenario 1b:** Demand is expected to increase from 14,820 in 2023 to a peak of 27,520 people in 2029. In the 2023-27 period there is an average demand of around 19,050 people. This reduces to around 1,500 people on average during the 2030s because the vast majority of the interventions have been implemented by 2030.

Under both scenarios, in the 2023-27 period building envelope specialists, plumbing and HVAC trades, and construction trades supervisors are expected to account for approximately 47% of that average demand, followed by scaffolders and roofers which account for a total of approximately 15%. Beyond 2030 the absolute labour demand is much reduced to deliver the remaining interventions but the mix of occupations remains broadly similar.

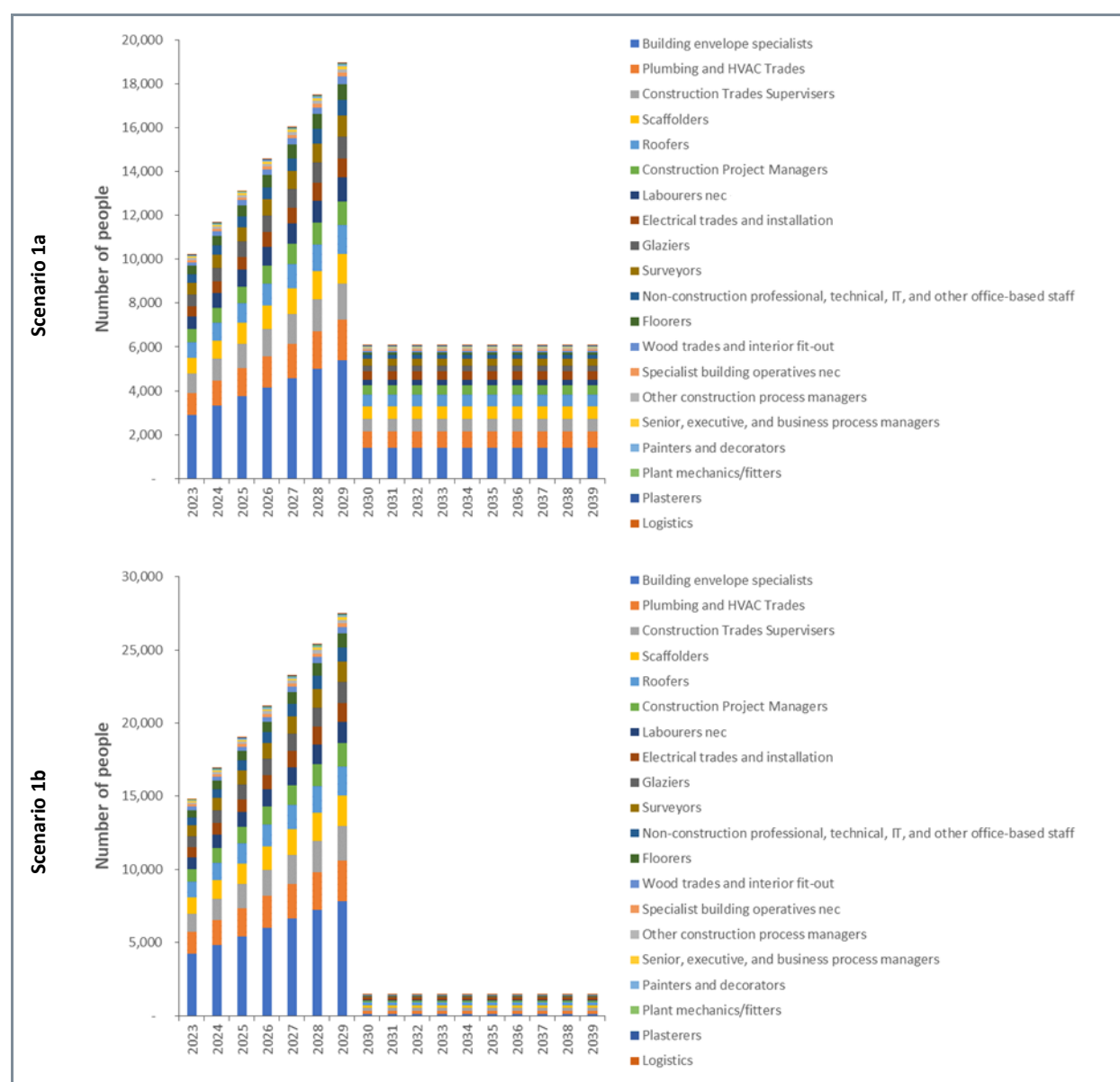


Figure 27: Labour demand for Scenario 1a and Scenario 1b

Figure 28 shows the labour demand profile broken down by occupation for interventions in social rental properties.

- **Scenario 1a:** Demand for this tenure is expected to increase from 950 in 2023 to a peak of 1,770 people in 2029. In the 2023-27 period there is an average demand of around 1,230 people. There is an average workforce of around 550 in the 2030s.

- **Scenario 1b:** Demand for this tenure is expected to increase from 1,500 in 2023 to a peak of 2,780 people in 2029. In the 2023-27 period there is an average demand of around 1,930 people. There is a negligible workforce in the 2030s because almost all of the properties will have been upgraded by 2030 in this scenario.

Under both scenarios, in the 2023-27 period the average demand for labour demand generated by the interventions in social rental properties is around 10% of the total average low carbon labour demand across all property types.

Over the same period, building envelope specialists, construction trades supervisors, and plumbing and HVAC trades are expected to account for approximately 53% of the average low carbon demand in social rental, followed by scaffolders and roofers which account for a total of approximately 10%.

The negligible demand beyond 2030 can be explained by the very low number²⁹ of social rental properties with an EPC band of A or B.

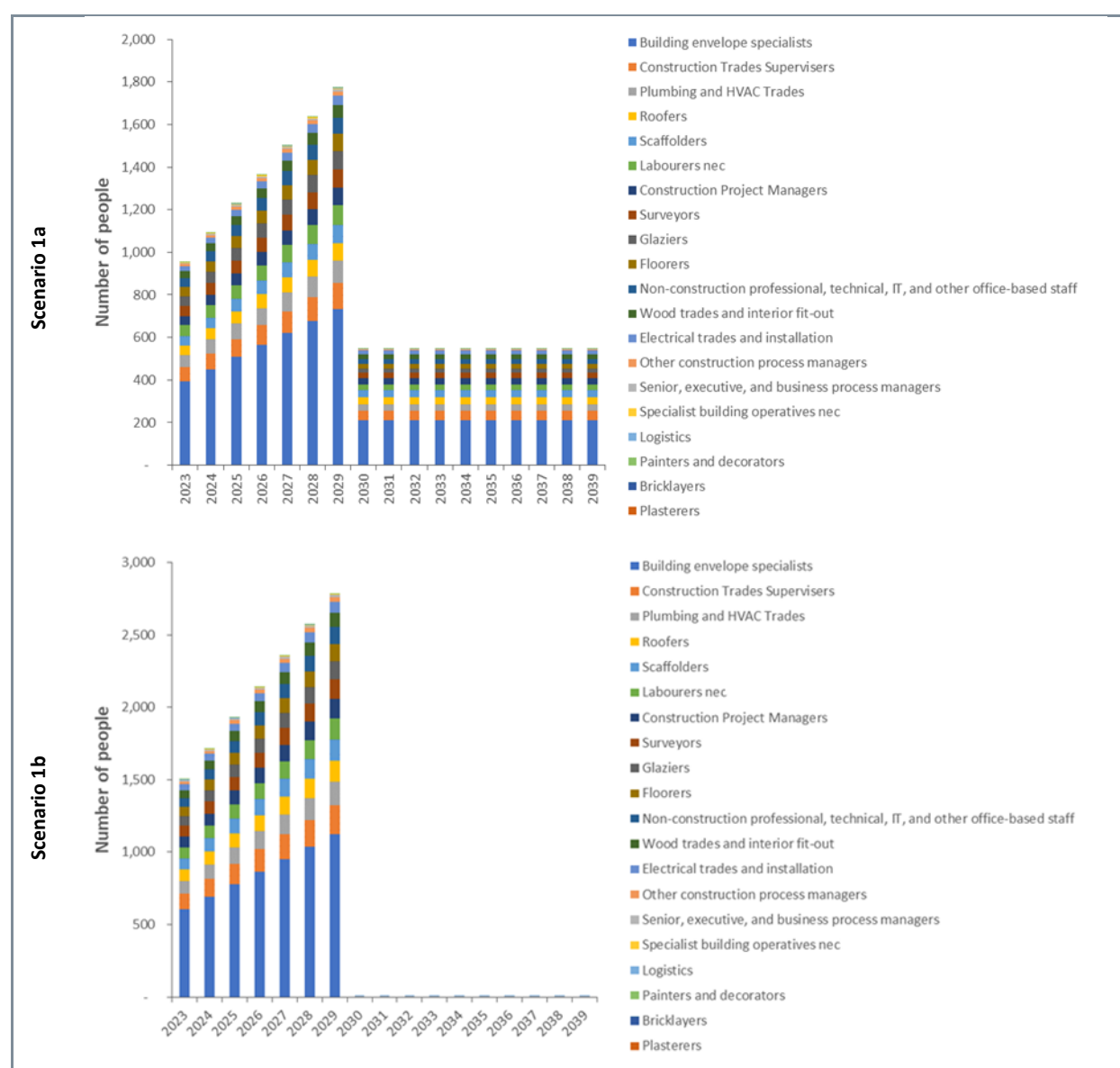


Figure 28: Labour demand for Scenario 1a and Scenario 1b: social rental

Figure 29 shows the labour demand profile broken down by occupation for interventions related to public non-housing properties.

²⁹ Less than 1.5% of the EPC certificates lodged between 2013 and 2022 for social rental properties.

- **Scenario 1a:** Demand for this property type is expected to increase from 420 in 2023 to a peak of 780 people in 2029. In the 2023-27 period there is an average demand of around 540 people. In the 2030s an average of around 650 people per annum are required to implement the remaining interventions.
- **Scenario 1b:** Demand for this property type is expected to increase from 780 in 2023 to a peak of 1,440 people in 2029. In the 2023-27 period there is an average demand of around 1,000 people. This reduces to around 300 people on average during the 2030s because the vast majority of the interventions have been implemented by 2030.

Under both scenarios, in the 2023-27 period the average demand for public non-housing sits at approximately 5% of the total average low carbon retrofit labour demand across all property types.

Over the same period, plumbing and HVAC trades, scaffolders and construction trades supervisors are expected to account for approximately 44% of the average demand for public non-housing, followed by roofers and electrical trades and installation which account for a total of approximately 17%. Beyond 2030 the absolute labour demand is reduced to deliver the remaining interventions but the mix of occupations remains broadly similar.

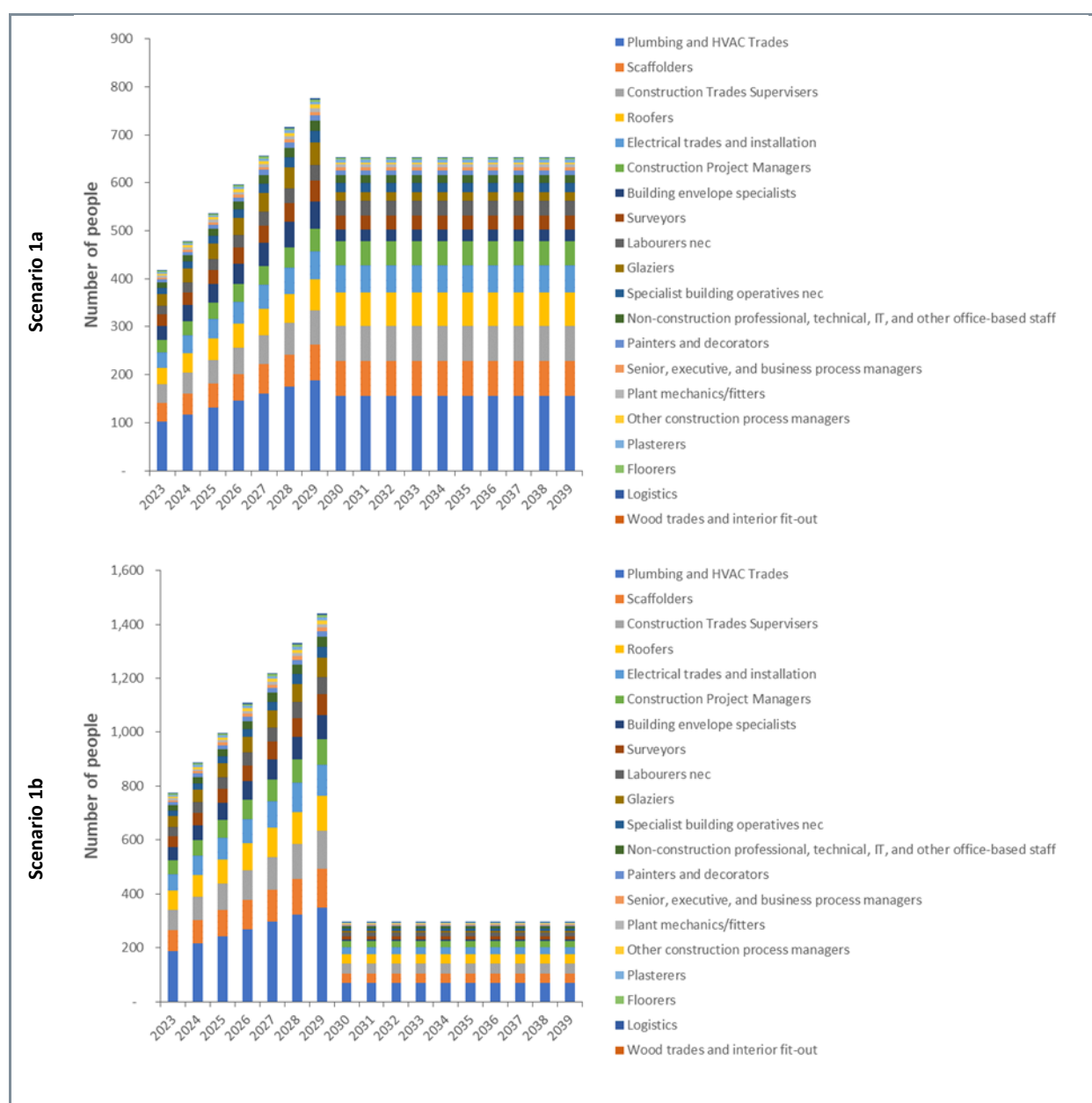


Figure 29: Labour demand for Scenario 1a: public non-housing

6.2. SCENARIO 2

Scenario 2 considered a larger number of assumptions compared with Scenario 1a and Scenario 1b. It assumes a short-to-medium-term demand being driven by the social rental and the public non-housing sector. These sectors are assumed to start delivering interventions at a faster pace and on a wider scale than the private sector with the aim of improving the energy performance of all properties currently in EPC band C and below by 2030. This outcome compares with that of the private sector which has been modelled to deliver improvements – between now and 2029 – more slowly and only on properties in EPC band D and below. Further details on the scenario parameters are shown in Figure 30.

Property type / Tenure		Timescale			
		2023-2029		2030-2039	
		EPC banding of the property	Roll-out	EPC banding of the property	Roll-out
Domestic properties	Owner occupied	D to G	Slow ramp-up	A to C	Uniform
	Private rental	D to G	Slow ramp-up	A to C	
	Social rental	C to G	Fast ramp-up	A to B	
	Not-defined Other-unknown	D to G	Slow ramp-up	A+ to C	
Non-domestic properties	Private commercial	D to G	Slow ramp-up	A+ to C	
	Public non-housing	C to G	Fast ramp-up	A+ to B	

Figure 30: Modelling assumptions for Scenario 2

Figure 31 shows the labour demand profile broken down by occupations for Scenario 2. Under this scenario, demand is expected to increase from 7,560 in 2023 to a peak of 25,790 people in 2027. In the 2023-27 period there is an average demand of around 17,100 people. In the 2030s an average of around 5,180 people per annum are required to implement the remaining interventions.

Over the 2023-27 period building envelope specialists, plumbing and HVAC trades, and construction trades supervisors are expected to account for approximately 47% of the average demand, followed by scaffolders and roofers at 14% combined.

Beyond 2030, these same three occupations are expected to account for approximately 45% of that annual demand, followed by scaffolders and roofers at 19% combined.

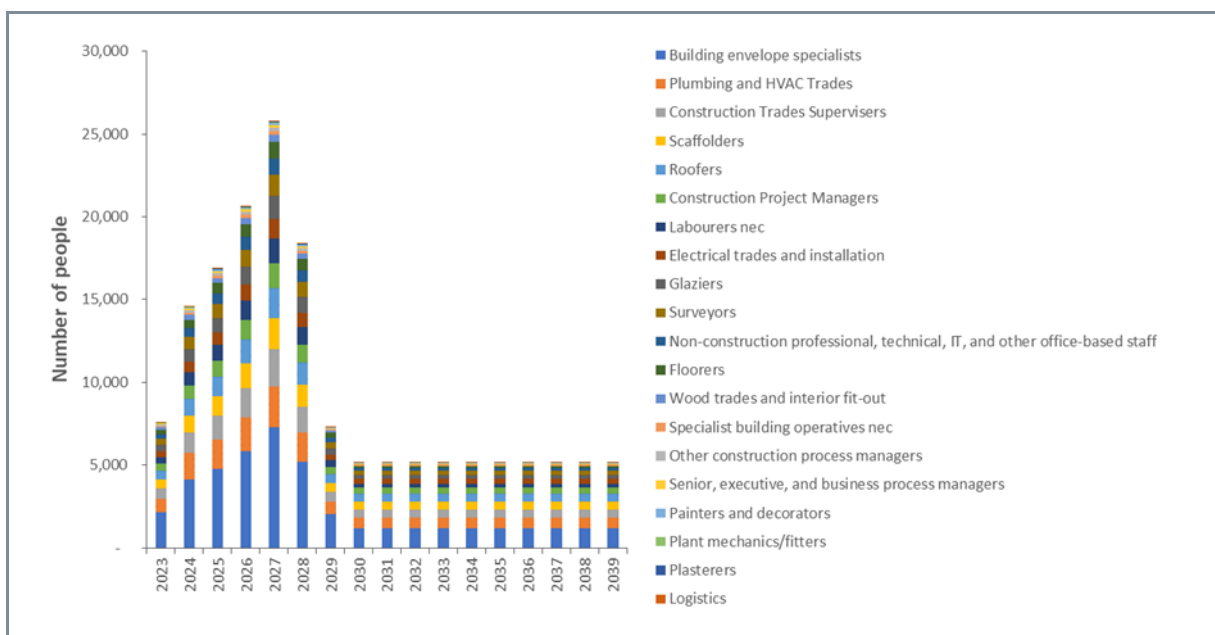


Figure 31: Labour demand for Scenario 2

Figure 32 shows the labour demand profile broken down by occupations for interventions related to social rental properties. Under Scenario 2, demand for this tenure type is expected to increase from 2,210 in 2023 to a peak of 4,950 people in 2024. In the 2023-27 period there is an average demand of around 2,800 people. There is a negligible workforce in the 2030s because almost all of the properties will have been upgraded by 2030 in this scenario.

The peak in 2024 is considerably higher than the 2029 peak in Scenarios 1a and 1b, and with its earlier occurrence may be challenging to meet by 2024. This will be explored later in the context of the wider construction industry labour demand in the next section.

The 2023-27 average demand for social rental properties is approximately 15% of the total average low carbon labour demand over that period across all property types.

Over the same period, building envelope specialists, construction trades supervisors, and plumbing and HVAC trades are expected to account for approximately 53% of the average demand for social rental, followed by roofers and scaffolders at 10% combined.

The negligible demand beyond 2030 can be explained by the very low number³⁰ of social rental properties with an EPC band of A or B.

³⁰ Less than 1.5% of the EPC certificates lodged between 2013 and 2022 for social rental properties.

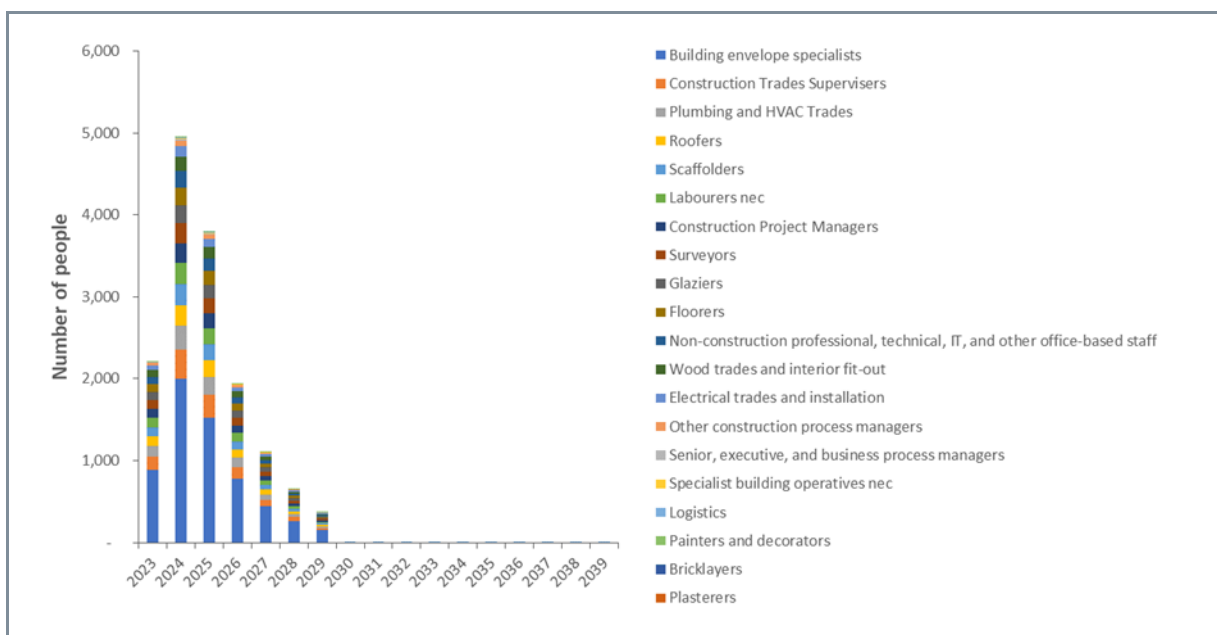


Figure 32: Labour demand for Scenario 2: social rental

Figure 33 shows the labour demand profile broken down by occupation for interventions related to public non-housing properties. Under Scenario 2, demand for this property type is expected to increase from 1,140 in 2023 to a peak of 2,560 people in 2024. In the 2023-27 period there is an average demand of around 1,450 people. In the 2030s an average of around 300 people per annum are required to implement the remaining interventions.

The 2023-27 average demand for public non-housing is approximately 7% of the total average low carbon labour demand over that period across all property types.

Over the same period, plumbing and HVAC trades, scaffolders and construction trades supervisors are expected to account for approximately 44% of that average demand for public non-housing, followed by roofers and electrical trades and installation at 17% combined).

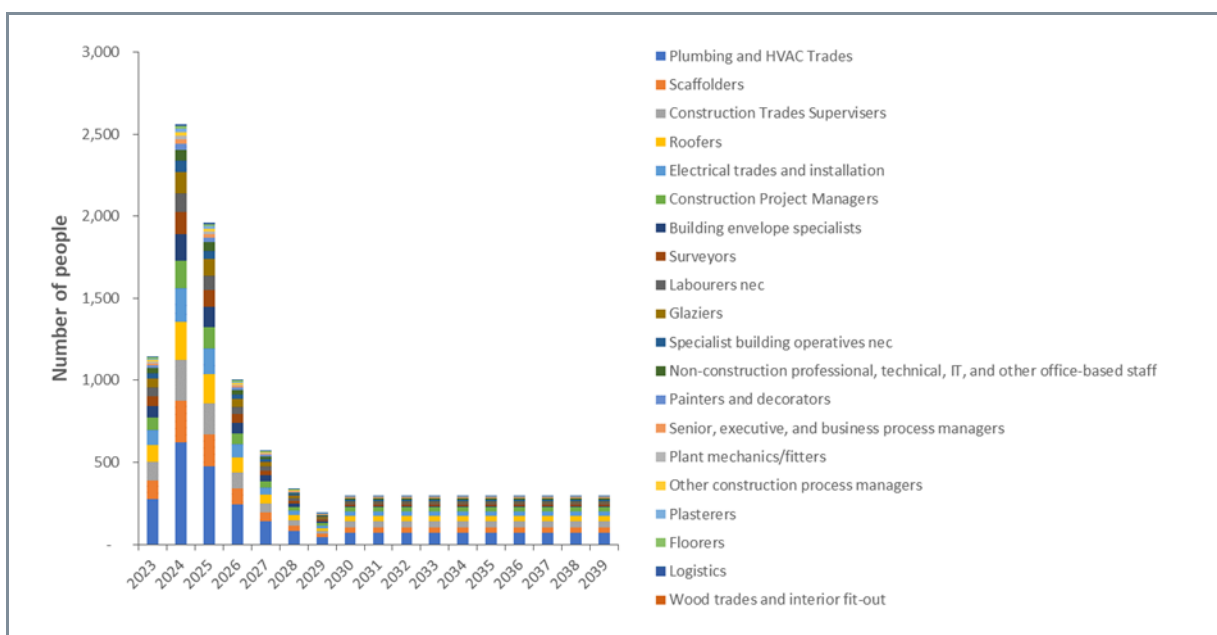


Figure 33: Labour demand for Scenario 2: public non-housing

6.3. SCENARIOS 3A AND 3B

Scenarios 3a and 3b develop Scenario 2 by assuming that different types of interventions might be delivered at different paces depending on factors such as funding availability and ease of delivery. Under Scenario 3a, fabric-related interventions on social rental and public non-housing properties are delivered at a faster pace than others which have a slow ramp up. Scenario 3b is a variation of Scenario 3a in which system-related interventions on social rental and public non-housing properties are delivered at a faster pace than the others.

Further details on the scenarios' parameters are shown in Figure 34.



Figure 34: Modelling assumptions for Scenario 3a and Scenario 3b

Under both scenarios, building envelope specialists, plumbing and HVAC trades, and construction trades supervisors are expected to account for approximately 47% of the 2023-27 average demand, followed by scaffolders and roofers which account for a total of approximately 15%. Beyond 2030 the absolute labour demand is much reduced to deliver the remaining interventions but the mix of occupations remains broadly similar to that observed over the 2023-27 period.

Overall, there are no significant differences between the total labour demand arising from these two scenarios.

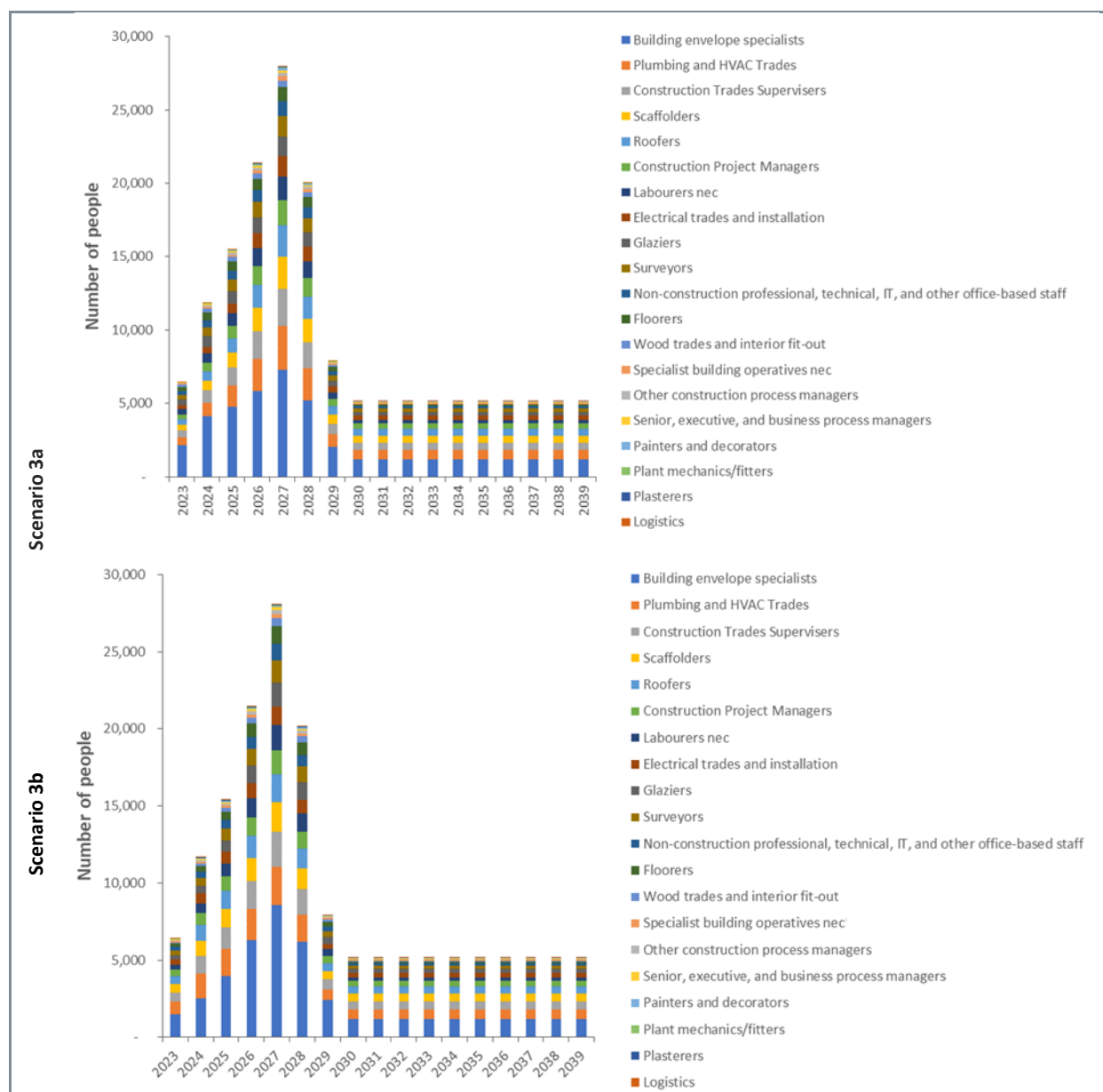


Figure 35 shows the labour demand profile broken down by occupation for Scenario 3a and Scenario 3b.

- **Scenario 3a:** Demand is expected to increase from 6,460 in 2023 to a peak of 27,990 people in 2027. In the 2023-27 period there is an average demand of around 16,640 people. In the 2030s an average of around 5,180 people per annum are required to implement the remaining interventions.
- **Scenario 3b:** Demand is expected to increase from 6,400 in 2023 to a peak of 28,120 people in 2027. In the 2023-27 period there is an average demand of around 16,620 people. In the 2030s an average of around 5,180 people per annum are required to implement the remaining interventions.

Under both scenarios, building envelope specialists, plumbing and HVAC trades, and construction trades supervisors are expected to account for approximately 47% of the 2023-27 average demand, followed by scaffolders and roofers which account for a total of approximately 15%. Beyond 2030 the absolute labour demand is much reduced to

deliver the remaining interventions but the mix of occupations remains broadly similar to that observed over the 2023-27 period³¹.

Overall, there are no significant differences between the total labour demand arising from these two scenarios.

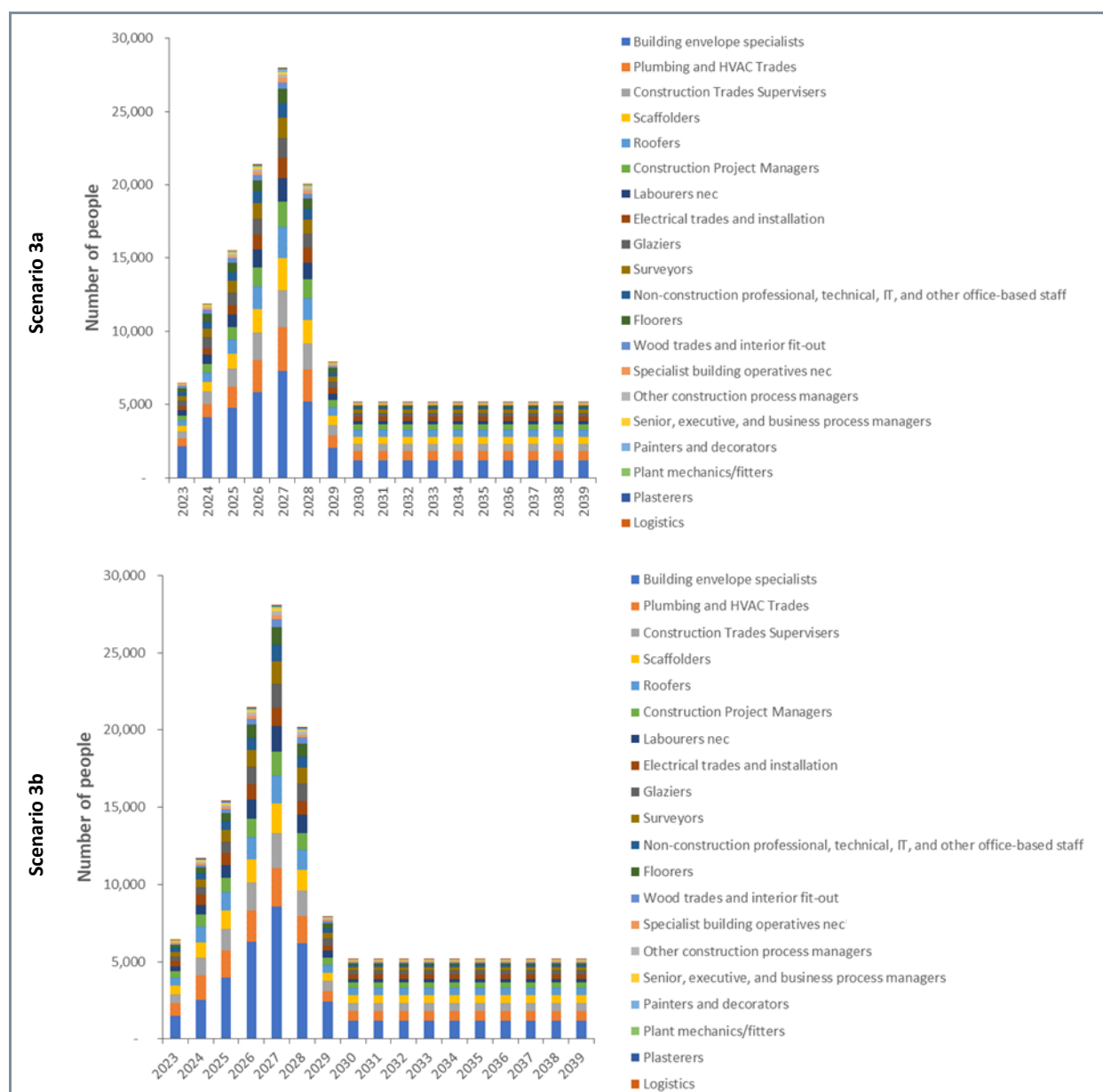


Figure 35: Labour demand for Scenario 3a and Scenario 3b

Figure 36 shows the labour demand profile broken down by occupation for interventions for social rental properties.

- **Scenario 3a:** Demand is expected to increase from 1,740 in 2023 to a peak of 3,770 people in 2024. In the 2023-27 period there is an average demand of around 2,600 people.
- **Scenario 3b:** Demand is expected to increase from 1,190 in 2023 to a peak of 3,150 people in 2027. In the 2023-27 period there is an average demand of around 2,370 people.

Under both scenarios, between 2023 and 2027 the average labour demand for social rental work is approximately 15% of the total average low carbon labour demand across all property types.

³¹ The annual demand share of building envelope specialists, plumbing and HVAC trades, and construction trades supervisors increases to 45% and that of scaffolders and roofers to 19%.

Over the same period, building envelope specialists, construction trades supervisors, and plumbing and HVAC trades are expected to account for approximately 55% of the average demand for social rental in Scenario 3a and 52% of the average demand for social rental in Scenario 3b. Roofers and scaffolders (combined) follow with approximate percentages of 12% under Scenario 3a and 19% under Scenario 3b.

In both cases, the negligible demand beyond 2030 can be explained by the very low number³² of social rental properties with an EPC band of A or B.

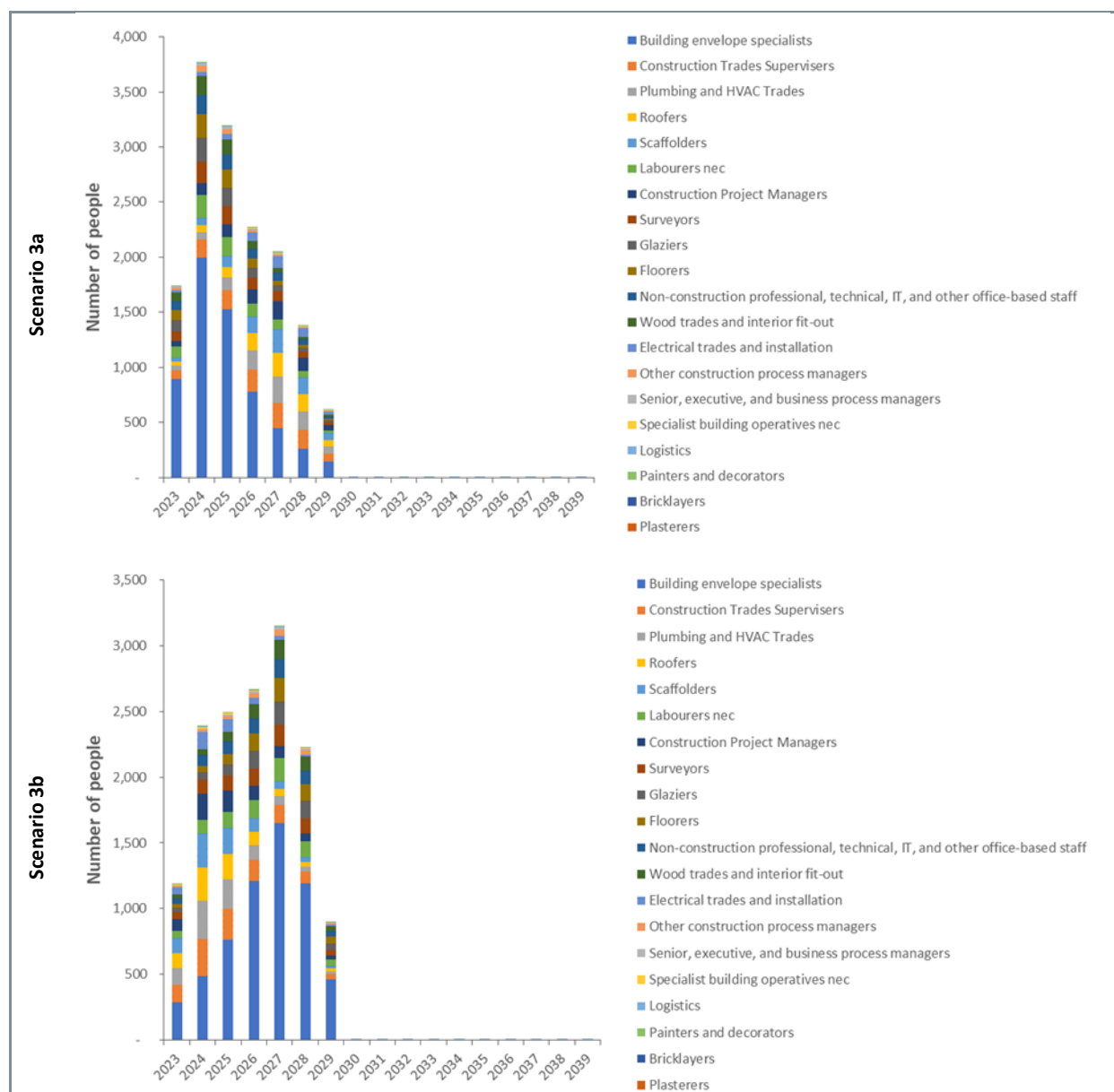


Figure 36: Labour demand for Scenario 3a and Scenario 3b: social rental

Figure 37 shows the labour demand profile broken down by occupation for interventions related to public non-housing properties.

- **Scenario 3a:** Demand for this property type is expected to increase from 510 in 2023 to a peak of 1,830 people in 2027. In the 2023-27 period there is an average demand of around 1,190 people.
- **Scenario 3b:** Demand for this property type is expected to increase from 1,000 in 2023 to a peak of 2,200 people in 2024. In the 2023-27 period there is an average demand of around 1,390 people.

³² Less than 1.5% of the EPC certificates lodged between 2013 and 2022 for social rental properties.

Under both scenarios, between 2023 and 2027 the average demand for public non-housing is approximately 7% of the total average low carbon labour demand across all property types.

Over the same period, plumbing and HVAC trades, scaffolders and construction trades supervisors are expected to account for approximately 42% of that average demand for public non-housing in Scenario 3a and 45%, of that average demand for public non-housing in Scenario 3b. Roofers and electrical trades and installation (combined) follow with approximate percentages for public non-housing of 16% under Scenario 3a and 18% under Scenario 3b. Beyond 2030 the absolute labour demand to deliver the remaining interventions is reduced but the mix of occupations remains broadly similar to that observed over the 2023-27 period³³.

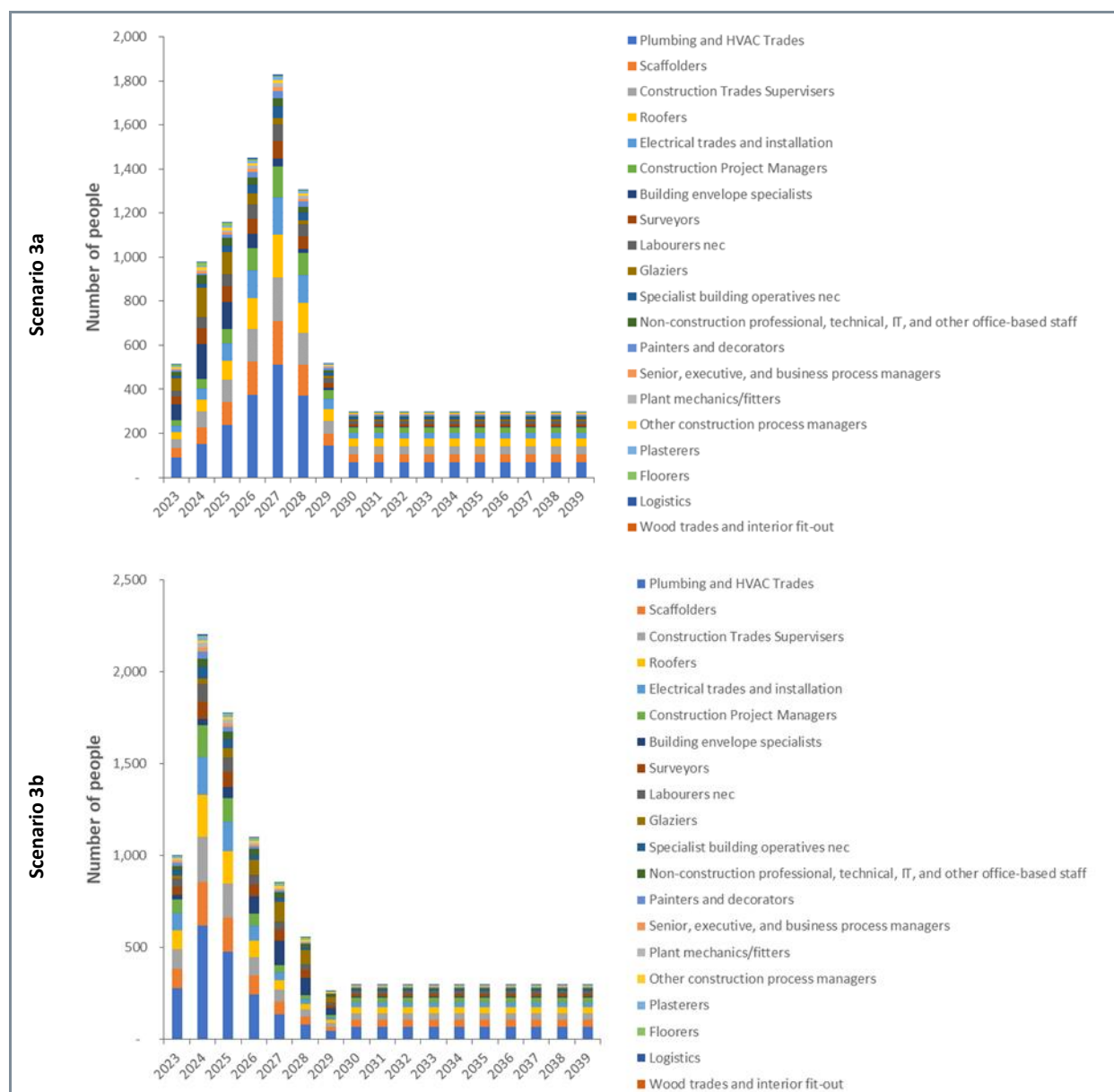


Figure 37: Labour demand associated with Scenario 3a and Scenario 3b: public non-housing

³³ The annual demand share of plumbing and HVAC trades, scaffolders and construction trades supervisors increases to 48% and that of roofers and electrical trades and installation to 20%.

7. LABOUR DEMAND IN THE CONTEXT OF THE WIDER CONSTRUCTION WORKFORCE

The workforce required to deliver the low carbon retrofit interventions will be working in the context of the wider construction industry. This workforce will come from the wider Greater London region, neighbouring regions and other regions in the UK. However, to demonstrate the relative scale of the low carbon retrofit workforce we have compared that workforce to the wider construction workforce in the Greater London region.

Average estimates of low carbon labour demand over the 2023-27 period have been calculated as part of the analysis. This five-year period allows a comparison with the five-year period from 2023-27 for the wider construction demand analysis published by CITB in its *CSN Industry Outlook - 2023-2027* report³⁴.

The results of the analysis are shown in Table 8. The table compares the average 2023-2027³⁵ low carbon labour demand in the CLF boroughs under each of the five scenarios with the average construction labour demand for Greater London in the same period.

Overall it can be seen that the low carbon retrofit workforce in the CLF boroughs accounts for between 4% and nearly 6% of the overall construction workforce in relevant occupations for the period 2023 to 2027. The lowest share is in Scenario 1a and the highest in Scenario 1b. This would suggest that the extent to which work includes EPC Band C is a key factor in the magnitude of the labour demand. The overall share of the construction workforce has some very large variations at an occupational level. Scaffolders, roofers, glaziers and building envelope specialists all have a share of more than about 20%, with the low carbon labour demand for scaffolders in the 12 CLF boroughs exceeding the entire London scaffolder workforce in all but one of the scenarios. This does not necessarily represent a high level of absolute demand in low carbon skills but highlights that there may be challenges in recruiting to these roles because of relatively low numbers in the wider London construction sector as seen in the CITB CSN report mentioned above.

³⁴ <https://www.citb.co.uk/about-citb/construction-industry-research-reports/construction-skills-network-csn/>

³⁵ The 2023-2027 period was chosen in order to align the output of this commission with published figures.

Table 8: Low carbon labour demand in the context of the Greater London construction workforce.

Occupational group	Average 2023-2027 CITB CSN London demand ³⁶	Average 2023-2027 low carbon retrofit labour demand as a % of the average labour demand in London				
		Scenario 1a	Scenario 1b	Scenario 2	Scenario 3a	Scenario 3b
Scaffolders	1,150	81.9%	123.8%	107.1%	101.8%	102.3%
Roofers	2,280	39.8%	59.8%	52.1%	49.4%	49.8%
Glaziers	3,440	20.3%	28.7%	25.6%	25.6%	24.4%
Building envelope specialists	19,770	18.9%	27.4%	24.4%	24.4%	23.1%
Floorers	3,090	16.4%	20.8%	20.6%	20.6%	19.7%
Construction Trades Supervisors	9,700	11.5%	16.7%	15.0%	14.3%	14.3%
Plumbing and HVAC Trades	16,360	7.9%	11.8%	10.6%	9.9%	10.6%
Labourers nec ³⁷	11,540	6.6%	8.8%	8.4%	8.3%	8.2%
Construction Project Managers	15,370	4.9%	7.3%	6.4%	6.1%	6.0%
Surveyors	16,460	4.0%	5.8%	5.2%	5.1%	5.0%
Electrical trades and installation	24,330	2.4%	3.7%	3.2%	3.0%	3.0%
Specialist building operatives nec ³⁷	10,700	1.2%	1.8%	1.5%	1.4%	1.5%
Plant mechanics/fitters	3,820	0.7%	1.2%	1.0%	1.0%	1.0%
Plasterers	3,220	0.7%	1.2%	1.0%	0.9%	1.0%
Logistics	3,140	0.8%	1.2%	1.1%	1.0%	1.0%
Wood trades and interior fit-out	31,770	0.7%	1.0%	1.0%	1.0%	0.9%
Non-construction professional, technical, IT, and other office-based staff	71,750	0.7%	0.9%	0.9%	0.9%	0.8%
Painters and decorators	13,720	0.3%	0.6%	0.5%	0.4%	0.5%
Other construction process managers	36,250	0.3%	0.5%	0.4%	0.4%	0.4%
Senior, executive, and business process managers	30,840	0.3%	0.4%	0.4%	0.4%	0.4%
Total (listed occupations)	328,700	4.0%	5.8%	5.2%	5.1%	5.0%

8. CONCLUSIONS

The results presented in this report provide an evidence base on the scale of low carbon labour demand required to improve the energy efficiency of both domestic and non-domestic properties in the twelve borough which make up Central London Forward. The analysis presented in this main report and the technical annexes for each borough will facilitate the development of appropriate responses to ensure that the boroughs can ensure that strategies and policies are in place to best deliver the skills to meet the retrofit challenge. These conversations should include all stakeholders involved with the delivery of low carbon retrofit measures including local authorities, public & private sectors, colleges, training providers, organisations such as CITB, contractors and their supply chains. Consideration should be given to the length of time required to train the workforce in developing strategies. In some cases this

³⁶ CITB, 2023. *CSN Industry Outlook - 2023-2027* <https://www.citb.co.uk/about-citb/construction-industry-research-reports/construction-skills-network-csn/>

³⁷ Not elsewhere classified

may be a short upskilling course for an already fully qualified worker (eg air source heat pump installation for plumbers), but in other cases there will be a need to fully train new entrants to the industry.

The disaggregation of the work between public and private will present additional opportunities for where stakeholder may wish to target specific policy and action to drive forward low carbon retrofit and the drive towards net zero. The exact response will depend on the nature of the work in each borough but may include, for instance, a programme of work in social housing which can prepare the market for further work across the private sector. Given that social rental properties generally have a lower energy performance than private sector this would help improve the energy efficiency of those worse performing properties.

The presentation of the results demonstrates the potential medium-to-long term opportunities which exist within the sector. It may be possible to use this evidence to help overcome some of the potential funding challenges and ensure that funding can be most appropriately directed. It is also important to note that the apparent cliff edge in 2030 is driven by assumptions about what will be delivered over the remaining years of this decade. This includes assumptions around a large proportion of the work being delivered by 2030, there being no maintenance work included and no retrofit work on new build properties. The challenge will be ensuring sustainable employment in the medium to long terms which encourages training in the required skills to meet the short-term demand.

It was highlighted in the workshop that there are two aspects which are beyond the scope of this research but which may be of value in developing more fully suitable responses. The first of these is an assessment of the softer skills which may be required to deliver the retrofit measures and secondly a better undertaking of the training landscape in low carbon skills across the boroughs.

APPENDIX A. OCCUPATIONAL DEFINITIONS

Reference is made in this document to a range of occupational aggregates for construction-related occupations. This appendix contains details of the 166 individual occupations which are aggregated into the 28 occupational groups underpinning the analysis. These occupational groups reflect those used by the Construction industry Training Board (CITB) to forecast the future need of the construction industry. While being presented for completeness, not all the 28 occupational groups are involved in the delivery of energy improvement.

Occupations included within construction occupational aggregates (Four-digit codes refer to Office for National Statistics Standard Occupational Classification Codes 2010).	
1 Senior, executive, and business process managers ³⁸	
(1115) Chief executives and senior officials (1131) Financial managers and directors (1132) Marketing and sales directors (1133) Purchasing managers and directors (1135) Human resource managers and directors (1251) Property, housing and estate managers (1136) Information technology and telecommunications directors (2150) Research and development managers	(1162) Managers and directors in storage and warehousing (1259) Managers and proprietors in other services nec (1139) Functional managers and directors nec (2133) IT specialist managers (2134) IT project and programme managers (3538) Financial accounts managers (3545) Sales accounts and business development managers
2 Construction project managers ³⁸	
(2436) Construction project managers and related professionals	
3 Other construction process managers ³⁸	
(1121) Production managers and directors in manufacturing (1122) Production managers and directors in construction (1161) Managers and directors in transport and distribution (1255) Waste disposal and environmental services managers	(3567) Health and safety officers (3550) Conservation and environmental associate professionals
4 Non-construction professional, technical, IT, and other office-based staff (excl. managers) ³⁸	
131) IT operations technicians (3132) IT user support technicians (3534) Finance and investment analysts and advisers (3535) Taxation experts (3537) Financial and accounting technicians (3563) Vocational and industrial trainers and instructors (3539) Business and related associate professionals nec (3520) Legal associate professionals (3565) Inspectors of standards and regulations (2136) Programmers and software development professionals (2139) Information technology and telecommunications professionals nec (3544) Estate agents and auctioneers (2413) Solicitors (2419) Legal professionals nec (2421) Chartered and certified accountants (2424) Business and financial project management professionals (2423) Management consultants and business analysts (4216) Receptionists (4217) Typists and related keyboard occupations (3542) Business sales executives (4122) Book-keepers, payroll managers and wages clerks (4131) Records clerks and assistants (4133) Stock control clerks and assistants (7213) Telephonists (7214) Communication operators (4215) Personal assistants and other secretaries (7111) Sales and retail assistants (7113) Telephone salespersons	(3541) Buyers and procurement officers (3562) Human resources and industrial relations officers (4121) Credit controllers (4214) Company secretaries (7129) Sales related occupations nec (7211) Call and contact centre occupations (7219) Customer service occupations nec (9219) Elementary administration occupations nec (2111) Chemical scientists (2112) Biological scientists and biochemists (2113) Physical scientists (3111) Laboratory technicians (3421) Graphic designers (2463) Environmental health professionals (2135) IT business analysts, architects and systems designers (2141) Conservation professionals (2142) Environment professionals (2425) Actuaries, economists and statisticians (2426) Business and related research professionals (4124) Finance officers (4129) Financial administrative occupations nec (4138) Human resources administrative occupations (4151) Sales administrators (4159) Other administrative occupations nec (4162) Office supervisors (7130) Sales supervisors (7220) Customer service managers and supervisors (4161) Office managers

³⁸ Non-manual

5 Construction trades supervisors³⁸	
(5250) Skilled metal, electrical and electronic trades supervisors	
(5330) Construction and building trades supervisors	
6 Wood trades and interior fit-out³⁹	
(5315) Carpenters and joiners	(5442) Furniture makers and other craft woodworkers
(8121) Paper and wood machine operatives	(5319) Construction and building trades nec (25%)
7 Bricklayers³⁹	
(5312) Bricklayers and masons	
8 Building envelope specialists³⁹	
(5319) Construction and building trades nec (50%)	
9 Painters and decorators³⁹	
(5323) Painters and decorators	(5319) Construction and building trades nec (5%)
10 Plasterers³⁹	
(5321) Plasterers	
11 Roofers³⁹	
(5313) Roofers, roof tilers and slaters	
12 Floorers³⁹	
(5322) Floorers and wall tillers	
13 Glaziers³⁹	
(5316) Glaziers, window fabricators and fitters	(5319) Construction and building trades nec (5%)
14 Specialist building operatives not elsewhere classified (nec)³⁹	
(8149) Construction operatives nec (100%)	(9132) Industrial cleaning process occupations
(5319) Construction and building trades nec (5%)	(5449) Other skilled trades nec
15 Scaffolders³⁹	
(8141) Scaffolders, staggers and riggers	
16 Plant operatives³⁹	
(8221) Crane drivers	(8222) Fork-lift truck drivers
(8129) Plant and machine operatives nec	(8229) Mobile machine drivers and operatives nec
17 Plant mechanics/fitters³⁹	
(5223) Metal working production and maintenance fitters	(9139) Elementary process plant occupations nec
(5224) Precision instrument makers and repairers	(5222) Tool makers, tool fitters and markers-out
(5231) Vehicle technicians, mechanics and electricians	(5232) Vehicle body builders and repairers
18 Steel erectors/structural fabrication³⁹	
(5311) Steel erectors	(5319) Construction and building trades nec (5%)
(5215) Welding trades	(5211) Smiths and forge workers
(5214) Metal plate workers, and riveters	(5221) Metal machining setters and setter-operators
19 Labourers nec³⁹	
(9120) Elementary construction occupations (100%)	
20 Electrical trades and installation³⁹	
(5241) Electricians and electrical fitters	(5242) Telecommunications engineers
(5249) Electrical and electronic trades nec	
21 Plumbing and heating, ventilation, and air conditioning trades³⁹	
(5314) Plumbers and heating and ventilating engineers	(5319) Construction and building trades nec (5%)
(5216) Pipe fitters	(5225) Air-conditioning and refrigeration engineers
22 Logistics³⁹	
(8211) Large goods vehicle drivers	(3541) Buyers and purchasing officers (50%)
(8212) Van drivers	(4134) Transport and distribution clerks and assistants
(9260) Elementary storage occupations	
23 Civil engineering operatives not elsewhere classified (nec)³⁸	
(8142) Road construction operatives	(8123) Quarry workers and related operatives
(8143) Rail construction and maintenance operatives	
24 Non-construction operatives³⁸	

³⁹ Manual

(8117) Metal making and treating process operatives	(9249) Elementary security occupations nec
(8119) Process operatives nec	(9233) Cleaners and domestics
(8125) Metal working machine operatives	(9232) Street cleaners
(8126) Water and sewerage plant operatives	(5113) Gardeners and landscape gardeners
(8132) Assemblers (vehicles and metal goods)	(6232) Caretakers
(8133) Routine inspectors and testers	(9241) Security guards and related occupations
(8139) Assemblers and routine operatives nec	(3319) Protective service associate professionals nec
25 Civil engineers³⁸	
(2121) Civil engineers	
26 Other construction professionals and technical staff³⁸	
(2122) Mechanical engineers	(3119) Science, engineering and production technicians nec
(2123) Electrical engineers	(3121) Architectural and town planning technicians
(2126) Design and development engineers	(3122) Draughtspersons
(2127) Production and process engineers	(3115) Quality assurance technicians
(2461) Quality control and planning engineers	(2432) Town planning officers
(2129) Engineering professionals nec	(2124) Electronics engineers
(3112) Electrical and electronics technicians	(2435) Chartered architectural technologists
(3113) Engineering technicians	(3531) Estimators, valuers and assessors
(3114) Building and civil engineering technicians	(3116) Planning, process and production technicians
27 Architects³⁸	
(2431) Architects	
28 Surveyors³⁸	
(2433) Quantity surveyors	
(2434) Chartered surveyors	

APPENDIX B. ACKNOWLEDGEMENTS

We would like to acknowledge the invaluable input of a number of colleagues across London who have supported this work. This includes representatives from the CLF Boroughs along with the GLA who attended the workshop. We would also like to thank representatives of Retrofit London who input to early stages of this research.

