NET ZERO AND CONSTRUCTION

Perspective and pathways

Contents

Foreword

Brian Berry, Chief Executive of the Federation of Master Builders (FMB) and Chair of the Construction Leadership Council's (CLC) Domestic Repair, Maintenance and Improvement Working Group.

Fighting climate change is the biggest issue facing our planet and affects us all.

The UK and Welsh Governments are legally obliged to reach net zero carbon emissions by 2050, with the Scottish Government aiming to achieve that target five years earlier. Reaching net zero means we will no longer be reliant on fossil fuels like coal and gas and replace them with clean fuel sources – a process known as decarbonisation.

For the construction sector the challenge is significant, and it will take all of us – employers and their member organisations, governments, the Further Education sector and a whole range of stakeholders – to help us achieve it.

In October 2021, the UK Government published two key strategies, one for net zero and a complementary strategy about heat and buildings. They are to be welcomed as a significant step in the right direction but they are not on their own sufficient to deliver the task in hand.

As this timely report outlines, retrofitting our homes and other buildings so that they are much more energy efficient is critical for the construction sector to reach net zero.

The size and scale of that challenge is enormous and without creating greener and more energy efficient buildings we simply won't be able to deliver net zero. That's why employers across the sector are crying out for a national retrofit strategy that shows a long-term, funded commitment to retrofit.

We know that previous schemes often did more harm than good to the reputation of the sector. That's why we need a clear pipeline of work – and a skills plan to accompany it – to give employers confidence that reshaping their businesses to support retrofit is going to be worth it.

There's no doubt that our industry recognises the need to reach net zero. Construction employers want to play a leading role. But they've got to be able to plan ahead with confidence and, currently, they simply aren't able to do that.

The CLC and CITB have worked together to produce this report which we hope provides a deeper understanding of the net zero challenge for construction employers. We lay out six priority recommendations which we believe are necessary for construction to reach net zero. If they are delivered, I'm sure that construction businesses across the country will truly be in better position to build a greener and more sustainable Britain.

Introduction

CITB's Building Skills for Net Zero research identified a big opportunity for the construction sector in retrofitting homes and buildings to be much more energy efficient. The report was clear that net zero can be achieved in UK construction by 2050, but not without radical changes to the sector.

Many of these changes go far beyond the scope of CITB. But there are plenty of skills challenges which will form part of the solution.

This paper was requested by the Construction Leadership Council (CLC) following the publication of CITB's research.

It aims to examine the skills and training needed to deliver retrofit work under the CLC's proposed National Retrofit Strategy but would equally apply to any national scale retrofit programme. It summarises existing research and evidence from various sources and pulls together their findings.

Key findings

There are an estimated 29 million buildings across the UK that will need to be retrofitted. However, demand currently doesn't exist from homeowners and measures are expensive and disruptive.

A long-term programme of work is needed to give businesses and training providers the confidence to invest in skills and training for energy efficiency retrofit. Previous Government initiatives have led to peaks and troughs in demand, variable quality of delivery, and resulted in job losses, leading to lack of confidence to invest among small businesses.

The Government's recent publication of the N*et Zero Strategy: Build Back Greener and the Heat and Buildings Strategy*, goes some way towards addressing the challenges associated with decarbonising our homes, but do not include a long term, funded retrofit strategy. There is an opportunity now to influence how the policies, funding and actions under development can be used to support retrofit activity.

Retrofit work will be largely done by smaller firms, the majority of which are already busy. Energy efficiency retrofit is seen as higher risk by these firms. This is because previous Government schemes were thought to have brought unscrupulous firms into the market whose poor-quality workmanship is felt to have damaged consumer confidence.

Improving the fabric of a building prior to installing a low carbon heat source is vital, and a 'whole house' approach to retrofit is best. However, this can be done in stages.

A planned approach to future skills is needed so that training matches need and demand. Coordination of training at a local level will need to be improved through industry, training providers, and local government collaboration. Training courses need to be developed and advertised to promote easy upskilling of workers as technology and knowledge requirements change.

There is an opportunity for Local Skills Improvement Plans, supported by Skills Accelerator funding to drive this work in England.

Tradespeople need to understand how a building works as a system and how the different elements of retrofit measures interact. This could potentially be done through multi-skilled installers who will need to work collaboratively and in sequence on a building.

Tradespeople will also increasingly need a broader skill set, including communication, so that they can work with residents, to help them understand the changes to their homes. There will need to be much more training around retrofit rather than just on new build, as is the case at the moment.

A number of roles have existing skills shortages, and many will need large increases in numbers to meet government targets, including:

- **Energy assessors**, as the use of Energy Performance Certificates increases
- **Retrofit coordinators** will be essential to ensure quality as different systems are installed alongside each other – forecasts suggest 50,000 required by 2030
- **Project managers** with an understanding of the retrofit process – 86,500 required by 2028
- **Insulation installers**. Existing installers will need to be upskilled if minimum qualifications are set in PAS2035 – the standards everyone has to follow in retrofitting buildings
- **Heat pump installers**. Starting by upskilling existing Gas Safe engineers, existing training needs to be improved and standardised – 50,000 required by 2030.

The CLC's six priority actions for industry and government

To address these findings, the collated research points to the CLC's six priority actions that government working with the construction sector could bring forward:

1. Construction employers, particularly SMEs, need confidence in a long-term pipeline of work to invest in green skills. Government should provide detailed retrofit plans and a clear way to pay for them.
2. A detailed and specific skills plan for retrofit is required. This plan should map how skills demand will be met in line with the broader retrofit plans and sequenced and funded accordingly. New standards and qualifications will need to be developed, existing ones updated, and provision aligned with the skills needed to deliver retrofit on a national scale.
3. Skills funding must be reviewed to make sure it supports the skills plan.
4. Quality systems, skills and competency requirements and minimum standards should be developed and enforced. These will make sure skills are available, retrofit is effective and delivers on net zero targets.
5. Building passports should be developed. They will provide information on the current state of homes, with actions, sequencing and costs of changes towards improved energy efficiency.
6. Industry, government and stakeholders need to communicate effectively and work collaboratively to develop skills need to deliver any new national retrofit plans.

Existing Evidence

This review of the evidence was carried out in Autumn 2021 by CITB. Though there is a huge and growing body of work looking at domestic retrofit in the UK, our review focused on reports and evidence with a significant focus on the skills agenda, and particularly those specifically targeting construction skills within CITB's remit.

BEIS Supply Chain Demonstrator Project Evaluation, 2021

Overview

An evaluation of the Department for Business, Energy and Industrial Strategy (BEIS) Supply Chain Demonstrator Project[1] that tested approaches for increasing the rates of energy efficiency improvements among owner occupiers.

Findings

When setting up supply chains there was sufficient interest from specialists such as heat pump installers but a lack of interest from general builders who will be needed to build critical mass for a national retrofit scheme. Builders were reluctant to engage due to scepticism about likely returns and long-term prospects of Government-funded schemes, full order books, lack of interest in growing their business, and perceived risk due to the complexity of the work.

The project also had difficulty in recruiting sufficient retrofit coordinators but reported that this issue was starting to be resolved. There were also issues with health and safety on site.

Other feedback from scheme participants included a lack of interest in training that doesn't result in certification, a lack of retrofit training, and little industry awareness of products best suited to retrofit jobs.

Conclusions

Participants realised that small changes and cuts to bureaucracy won't be enough to change the level of interest in these schemes from a large enough section of the supply chain. Getting full supply chains engaged and interested in retrofit schemes will need a cultural shift instigated through policy change.

Stakeholders agreed that a stronger push at a national level is needed to create market and supply chain interest in retrofit, including more funding, stricter standards and a national campaign.

1. BEIS, Evaluation of the supply chain demonstrator project, BEIS Research Paper Number 2021/00

Local Government Association, Local Green Jobs Accelerating a Sustainable Economic Recovery, 2020

Overview

In 2020 the Local Government Association (LGA) published a report on local green jobs accelerating a sustainable economic recovery[2]. It provides analysis of the jobs required for a net zero economy in England, where these will be located in the coming years, and the role that local government could play working with industry to address the sector's skills demands. The report looks at skills gaps around new technologies, including highlighting short terms gaps in heat pump installation and longer-term gaps in solar, smart controls and others.

Findings

One of the areas considered to have a key near term skill gap (2020-2025) is heat pumps in relation to their design, specification and installation.

Low carbon heat: heat pumps – the Future Homes Standard from 2025 is likely to dramatically increase the need for heat pump installers in England. The demand for jobs will be seen across all regions. The initial challenge focuses on upskilling of the existing supply chain of gas safe engineers. In the future, as demand increases further, there may be a need for additional heating engineers to be trained and ready to enter the supply chain.

Energy Efficient products: heating controls – there is an increasing need for digital skills in addition to traditional electrical engineering. The Future Homes Standard and new 'smart' requirements are likely to accelerate a shift in demand away from traditional skills towards digital skills especially in installing digitalised electrical engineering controls. The installer network of heating systems will also need to effectively translate information on emerging heating technology to the customer. The regional demand for jobs will be localised in the area of manufacturers' core operations but also dependent on the existing heat installer supply chain to install the technology within homes and businesses. Skills requirements will increasingly focus on highly skilled software engineering expertise, requiring change in recruitment tactics to wider regions.

Solar photovoltaics – specific policy interventions could see increasing demand for the solar supply chain. Photovoltaic installers are relatively evenly distributed across regions, able to travel to work based on quick install times, and only need to provide limited maintenance to installed systems. Job and training opportunities relating to installation of solar photovoltaics should be looked at on this basis. Solar technician skill requirements will also be demand led; qualifications are required to install grid-connected solar, however there is a relatively robust installer base due to a previous boom in the sector.

Conclusions

The report concludes that local authorities have a key role to play by bringing together different stakeholder groups, drawing down funding for skills and training and developing an integrated approach. Furthermore, it states that by playing this role they can provide certainty to the supply chain and other stakeholders that have traditionally been demand led.

2. Local Government Association, Local Green Jobs Accelerating a Sustainable economic recovery, 2020

West Yorkshire Combined Authority (WYCA), Scaling Up Better Homes Yorkshire, 2020

Overview

The West Yorkshire Combined Authority has published a paper on scaling up their retrofit programme undertaken by the Better Homes Yorkshire partnership[3]. The partnership reviewed existing retrofit programmes, reports and guidance documents and carried out formal interviews with organisations delivering retrofit improvements through direct installation, coordination, advice or finance.

Findings

Skill shortages were seen as one of the key barriers to enabling a significant scaling up in retrofit activity. This was seen across a range of areas including planning, surveying, product specification, finance, modern methods of construction, renewable technologies, ventilation, business planning and onsite construction.

Interviewees attributed skills shortages to the short-term nature of retrofit initiatives. This deterred companies from investing in their staff's skills and provided little incentive for individuals to pursue apprenticeships or courses in relevant skills. This has damaged the reputation of the retrofit sector's commitment to the training of its workforce, making it difficult to attract new entrants.

It was noted that workers in different retrofit roles often didn't have a good understanding of how they fit with the bigger picture. It will be important for companies to focus on the whole retrofit process and develop multi-skilled installers in response. The paper also recommends a need for a better understanding of building physics and suggested this be included in PAS2035. An example was given of a lack of understanding regarding ventilation, which is not well understood even by more experienced builders.

Design and coordination roles such as the role of the Retrofit Coordinator are also seen to be essential, reflecting the need to make sure that quality is maintained at the intersection of different systems within the house. Coordination needs to transcend individual measures so that the installations are carried out as part of a whole house retrofit or part of a long-term plan. In the retrofit industry there are not enough workers with the necessary experience to have many apprentices. Apprenticeship uptake will also be limited by the lack of a long-term pipeline.

For retrofit to be scaled-up, interviewees spoke of the need for:

- A focus on improving a building's fabric as a first priority ahead of renewables and energy storage
- Initial high-quality, whole-house retrofit design, to recognised standards
- An improved approach to working with residents, informing them of the need for retrofit works, benefits, changes to the management of their property, energy bill changes and follow-up
- A standard for contractors appropriate to the level of work carried out – e.g. PAS2030 for larger installers or a simplified version for small contractors. Finding a balance between quality and standards will be necessary
- Consistent methodologies for contractors to allow training in common retrofit tasks. This would not restrict works available for households but allow common tasks to be consistently delivered at a dependable quality
- Checking the quality of work at every stage by experienced clerks to avoid damaging the fabric of the building causing costs, upheaval and inconvenience
- Coordination of training at a regional level and for industry, learning providers, colleges, local authorities and manufacturers to collaborate in order to achieve this
- Significant workforce development, though the skills needed are mostly already present in the construction workforce and in most cases would fit with existing skills sets of familiar trades
- Multi-skilled tradespeople to speed things up and reduce costs, through compliance with PAS2035 across multiple measures.

Conclusions

The report concludes that a critical missing factor to date has been a long-term pipeline of retrofit work that gives confidence in investment in training and business development in contrast to previous approaches.

3. West Yorkshire Combined Authority, Scaling Up Better Homes Yorkshire, 2020

Glasgow City Region, Home Energy Retrofit Final Report – Next Steps, October 2021[4]

Overview

This report summarises the Glasgow City Region approach to home energy retrofit and sets out proposed areas for future development and activity. It includes Grant Thornton's feasibility study which looked at actions required to successfully deliver a large scale retrofit programme.

Findings

The report highlighted the need for changes of policy and funding for retrofit from the UK and Scottish Government to deliver retrofit at scale. This is in contrast with the various existing small funding schemes, all with different criteria, currently allocated to councils on a competitive basis. These schemes do not give businesses the long-term confidence to invest in the skills of their staff and manufacturing capability.

A lack of supply chain capacity is a risk to the delivery of retrofit, but the opportunity to expand the local supply chain could be a benefit of retrofit at scale.

The need to significantly increase training across a range of occupations within construction and specialist retrofit roles is also identified in the report (including PAS2035 Retrofit Coordinators) alongside a better understanding of what training should be offered.

4. Glasgow City Region, Home Energy Retrofit Final Report – Next Steps, October 2021

CBI, Skills and Training for the Green Economy, 2021

Overview

Earlier this year the Confederation of British Industry (CBI) published its report on skills and training for the green economy[5]. The purpose of the research was to identify the opportunities and challenges to delivering the skills and training on the path to net zero.

Findings

The paper focuses on home efficiency, electric vehicles and clean power. The report states that at present skills and training are misaligned to the needs of these key industries and that there are serious concerns about the availability of current skills along with the training available to upskill people into the new roles. There is an immediate demand for skills and training due to the short timescales for delivery.

On energy efficiency the report highlights the need for retrofit coordinators and project managers and the need to train and recruit to meet demand. The report also notes the range of skills demanded for retrofitting. These will require different levels of qualifications for different roles, from fairly short duration courses for heat pump installers, to much more in depth, high-level qualifications for digital roles.

Government targets for heat pump installation means that the skills required to retrofit these into homes are required immediately. The report calls for core standards to be developed and backed by a national framework which are recognised by the entire sector. The report also references the Institute for Apprentices and Technical Education (IfATE) review of apprenticeships and their suitability for net zero.

5. CBI, Skills and Training for the Green Economy, 2021

West of England Combined Authority, Retrofit Skills Market Analysis, 2021

Overview

The West of England Combined Authority (WECA) Retrofit Skills Market Analysis[6], is intended to support the development of region-specific recommendations on job growth and skills gaps for retrofit.

Findings

Building Fabric

There is potential for job creation from product design and manufacture through to installation, with multiple roles required at each stage of the supply chain. A greater reliance on PAS2035 necessitates a higher number of retrofit advisors, coordinators, assessors, designers and evaluators as well as skilled retrofit installers. PAS2035 is also bringing about a greater need for technical skills and an understanding of consequential impacts, both of which require some upskilling of the installer base.

There are very strong practical skills in the sector but a lack of understanding of how to measure the impact of measures on building performance.

Qualified insulation installer roles and retrofit coordinators are seen as important yet increasingly difficult to recruit. There is also a need for higher skilled tradespeople.

Changes to Building Regulations Part L will increase buildings' thermal performance which increases the risk of condensation if not correctly addressed, meaning installer knowledge and training must address this issue. A minimum NVQ level 3 for insulation installers is likely to be introduced so there will be a need to upskill those who do not meet this level. Other areas for growth noted include administrative, project management and system design roles.

As a result of historical incentive schemes, a large number of competent installers work in other parts of construction, however they do not hold the NVQ necessary for working on retrofit. Many would return if a clear opportunity and incentive are presented along with a long-term clear trajectory of demand.

There is a requirement for skills that enable more effective interaction with residents. Installers will also need to have good numeracy and literacy to write up reports to enable improved monitoring and meet auditing requirements.

The growth in entry level jobs is expected to be relatively small. A high proportion of rendering professionals come from mainland Europe, so plastering or rendering professions will need to be upskilled and new ones recruited if the pool of EU labour is diminished. NVQs could be enhanced, and courses bolstered with additional modules to ensure new entrants are appropriately trained.

Retrofitting high rise buildings is seen as a particular skills challenge following Grenfell and the introduction of remedial measures is required to build industry capability to be able to deliver these works. The skills needed to assess product performance and test fire safety is also seen as a challenge. In addition, there will be a need for expertise in on-site inspections and auditing.

Use of Energy Performance Certificates (EPCs) are likely to become a key part of energy efficiency policy which will in turn lead to an increase in the demand for energy assessments and domestic and non-domestic energy assessors.

6. West of England Combined Authority, Retrofit Skills Market Analysis, June 2021

Heat Pumps

The report notes that the Heat Pump Association says that "the current route to becoming a heat pump installer is too costly, bureaucratic and confusing, with outdated content still being taught". The Association is updating access routes and course content. Many of the intermediate skills required already exist among gas boiler installers, with some upskilling required for the additional knowledge needed to install heat pumps. There will also be a need for an operations and maintenance workforce with specialist skills development in electrics, hydraulics and refrigeration.

Heat Networks

There is an established and knowledgeable workforce, but a need to grow numbers to meet expected demand for heat networks. The heat network design, build, operation and maintenance sub-sector does not face skills or labour shortages. However, a recent report commissioned by BEIS found that some organisations already struggle to fill a number of vacancies in occupations like senior project management and engineering roles[7]. There are a few specialised qualifications for those working in the heat network sector and most entry routes are not targeted. Transfer between sub-sectors often occurs at the lower level, such as in roles in construction or installation.

The report references previous research conducted by BEIS which found that there is a need to develop standardised heat network specific training infrastructure at all levels, with clear pathways including in apprenticeships and university courses. The Heat Network Skills Review conducted by BEIS highlights that there is likely to be a natural movement of skilled labour between non-renewable energy sectors to heat networks.

7. BEIS (2020) Heat Networks Skills Review

All Skills

In respect of training there were calls from industry for standardised training to ensure skills gaps are addressed and to give confidence to those undertaking the training. This needs to be supported by financial assistance for undertaking accredited training and support those committed to a career in the industry. Engagement also needs to be addressed in order for upskilling to be successful.

Training courses need to be flexible to accommodate technological advancements, changing policy incentives and apprenticeship standards as well as new skills requirements such as digital and behavioural skills. The current education system is demand led, this needs to change with a funding model that enables Further Education (FE) providers to plan delivery in advance of need with some level of security and give them confidence to invest in the necessary resources and deliver courses recognised by government.

Conclusions

The main challenge identified by industry respondents was policy stability which is vital to give the sector the certainty it needs to invest in the workforce.

The uncertainty surrounding projected demand growth was highlighted as a particular challenge for retrofit. The exploitation of incentive mechanisms in the past has resulted in poor performance as companies are set up to benefit from the schemes.

Whilst there was a clear call for action at the regional level, this was caveated with the need for a consistent approach nationally. The importance of ensuring local initiatives fit with regional objectives and align with national policies was emphasised. Interest in upskilling from the workforce was perceived to be the next most important challenge faced by industry particularly surrounding a lack of awareness about the roles available and the routes to achieving these.

If left to market forces alone, consumers will not demand the installation rates required to meet net zero. This is due to the high capital cost and long payback of some measures, particularly solid wall insulation and heat pumps.

CITB, Building Skills for Net Zero, 2021

Overview

The purpose of this research was to outline the skills implications for the workforce of the UK Government's commitment to achieve net zero by 2050.

Findings

The skills requirements identified by CITB's Building Skills for Net Zero research are detailed below:

Fabric first
All forms of insulation require a survey, as they can affect ventilation and alter the relative humidity profile through the wall, which can lead to condensation and damp. Insulation can also lead to overheating electrical systems if inappropriately installed. Insulation upgrades should be done as part of a holistic retrofit design, which would also include primary energy systems, energy distribution, draft stripping, and energy management systems.

Some of the required roles, such as surveying and designing each project, require deep knowledge of building systems, considerable experience and specialised training. Many of the installation tasks can be delivered with lower levels of training but millions of interventions are required every year, for decades.

Heat pumps
Again, surveys are needed to identify the best option for the property. Surveyors can recommend additional retrofit measures, so there is an argument for heat pump installation design surveyors to be qualified more widely. Residents also need training in the idiosyncrasies of heat pump operation.

The HPA estimates there were 900 heat pump installers in the UK in 2019 with skills in heat loss calculations, hydraulic balancing, flow temperature calculations and heating system sizing. Some are also F-Gas qualified. Installation also requires someone qualified to be able to connect the power supply. Widespread heat pump deployment will require upskilling of the current workforce and training the next generation of low-carbon heating installers.

Training would need to include a renewables heating training course, a general heat pump training course that teaches installers how a heat pump works and manufacturer-specific training courses. In total, this would make up a week's worth of training and all would require certificates with the right accreditation.

Hydrogen
There is a lack of required skills for hydrogen boiler installation. For existing Gas Safe installers, the additional training required to work with hydrogen would take about one day. For every installation, the pipework must be surveyed, even it if will only rarely need to be replaced. This would create a requirement for additional qualified surveyors, and a smaller number of fitters to replace pipework.

Around two hours would be required for each property survey, compared to four worker-days for each boiler installation. There are currently around 100 accredited gas training centres in the UK. Training is commercial and competitive and the consensus was that training bodies would develop their facilities to cover hydrogen if a demand for this training develops. There would be a requirement to either upskill or attract new engineers to the wider gas industry to enable hydrogen conversion.

All Skills

There will be a need for inter-trade awareness training. This would give each trade a common understanding of its impact on the overall building and an increasing requirement for multi-trade competence, for retrofit installations where multiple measures are required or where modern methods of construction are utilised. As new technologies are more widely introduced, there will be a need for these systems to be explained to the consumer to a much greater degree than, for example, a conventional gas boiler.

Retrofit Standards PAS2035 and PAS2038 will result in additional retrofit designers and coordinators to cope with demand. NVQs do not yet exist for all the roles required to support the standard. Developing these would be a highly beneficial, low-cost intervention which should be prioritised. Universities and colleges are likely to need considerable support so training for trainers will also be needed.

Current standards 'expect' but do not require a qualified surveyor to develop retrofit designs. Given the complexities involved, particularly in traditional buildings, there is concern that designers may be expected to work on systems with which they are not familiar.

Skills will also be needed for offsite retrofit, and traditional buildings where there are already severe skills gaps. Investment in additional training for assessors and for all the trades required for traditional retrofit will be required.

Closing the performance gap in retrofit will require specific skills in areas where there are already gaps. These including clients, contractors, installers and building managers, many of whom lack the expertise to make sure buildings avoid any gap between design and operational performance. A building, once in operation, may not perform due to poor quality design, construction or management. Respondents were also clear on the need to have a role that was responsible for ensuring quality over and above that of the Retrofit Coordinator, something akin to a Clerk of Works which has responsibility for overall quality and acts as the interface between trades.

Conclusions

Consistent, long-term policies will be needed to drive demand for low carbon technologies and give businesses the confidence to invest in skills and training.

Building passports can outline the needs of each building to achieve net zero as well as giving a clearer indication of the costs, labour and skills requirements. To ensure quality of workmanship, organisational competence and reduce the performance gap of installations, the use of quality management systems, regulation and competency schemes is supported.

In relation to training the research recommends the following:

- General net zero and low carbon training for all
- Ensuring training is refreshed to include net zero requirements including retrofit, offsite construction and traditional buildings
- Government funding supports the training required to deliver net zero
- Training between trades is required so all tradespeople understand the building as a system.

For further information contact:

Emma Link
Analyst
CITB

emma.link@citb.co.uk