



Reflections From Engaging a Network of Local Stakeholders in Discussing Training Needs for Sustainable Renovation

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Sustainable renovation of buildings is essential to create comfortable, affordable buildings fit for the future. Sustainable renovation delivers on a triple bottom line of improving environmental, social and economic impacts. There is a clear policy driver for reducing environmental impact in the form of carbon emissions and alongside achieving this homes and communities can become more comfortable places to live, creating jobs and economic value. The purpose of this paper is to share reflections from stakeholder engagement in identifying workforce training requirements and needs to achieve sustainable renovation. The paper stems from data collected in an exploratory workshop and follow up discussions gathering multiple construction stakeholders in Leeds, United Kingdom, early 2018. Participants represented a networked system of roles including policy influencers, procurement staff, training providers, employers and skilled professionals. These stakeholders identified two areas of training need for sustainable renovation: building performance and social value. Within these two themes, we consider potential training routes in delivery as well as incentives and opportunities. We hope this reflection offers a platform for further research, training and practice in developing environmental, social and economic benefits from building renovation.

Keywords: stakeholders, sustainable, renovation, training, triple bottom line

INTRODUCTION

The European (EU) building stock is responsible for approximately 40% of EU energy consumption (EC, 2020). Of those buildings, around three quarters were built before legislation on building performance was in place and 80% are likely to be present by 2050. At present, only 1% on average are renovated each year. This must increase to achieve carbon reduction targets such as net zero by 2050 in the United Kingdom or net zero by 2030 across local authorities (ibid).

To achieve the sustainable renovation we need, local stakeholders need to be willing and able to deliver. In order to deliver sustainable buildings which meet designed performance criteria in the United Kingdom, over 250,000 tradespeople need additional skills and knowledge (Maby and Owen, 2015). A complementary driver is the United Kingdom Social Value Act (2012) (DCMS (Department for Digital, Culture, Media & Sport), 2018), which requires those who commission public services to consider wider social, economic and environmental benefits before starting a

procurement process (Cabinet Office, 2016). Social value can be created through enabling job creation and better quality environments (Supply Chain Sustainability School, 2019).

Sustainable renovation can also lead to economic benefits, alongside these environmental and social rewards. Globally, sustainable renovation has been estimated to provide 18 jobs per €1million invested (C40 Cities, 2019; BPIE, 2020). In European estimates, sustainable renovation could bring economic benefits of €153–291bn depending on level of investments (Copenhagen Economics, 2012; BPIE, 2020). In the United Kingdom, energy efficiency retrofit, just one element of sustainable renovation, could lead to nearly 120,000 new direct jobs rising after 4 years to around 380,000 (Brown et al., 2020).

In terms of social benefit resulting from renovation, Temeljotov-Salaj and Lindkvist (2020) found that for 32% of householders (from 341) the main motivation for renovation were aesthetic (32%) and comfort (30%), followed by reduce energy costs (24%) and environmental friendliness (15%). Furthermore, in the England alone, 10.3% or 2.4 million households were classified as fuel poor in 2018 (BEIS, 2020). By increasing energy-efficiency of homes, the amount of fuel required for heat decreases and can lead to social benefit through comfort improvement and reduction in worry around energy costs for those considered to be fuel poor (Longhurst and Hargreaves, 2019). However, it is vital that renovation is well designed, safe, effective and delivered by trained professionals.

A local approach to sustainable renovation means creating a strategy focused on meeting local needs, using existing local assets, and tackling local issues in housing stock, skills and the labor market. Such an approach requires a networked system of roles, including policy makers and influencers, procurement staff, employers, training providers and skilled professionals. The skill sets of traditionally defined roles in building professions will need to be expanded so that each individual understands enough of the requirements of building energy decarbonization to play their role effectively (Janda and Killip, 2010).

The purpose of this paper is to share reflections from engaging local stakeholders to identify workforce training requirements and needs to achieve sustainable renovation. The paper stems from data collected in an exploratory workshop and follow up discussions with multiple construction stakeholders in Leeds in early 2018. The “triple bottom line” and a systems approach to construction training are presented first, followed by the method, insight and discussion of lessons learned before concluding the article.

Construction Training and Sustainability

The construction industry requires new knowledge to be developed and transferred through a complex and fragmented supply chain (Peterman et al., 2012). Previous policy related to sustainable building has focused on the installation of individual technology “measures,” as opposed to considering the whole supply chain as a collective “system” (Killip et al., 2018).

The lack of installer expertise in sustainable construction, specifically in low carbon construction, in the United Kingdom is partly because the construction processes involved require

“energy literacy” in all occupations, high levels of qualifications, multi-skilled people, integrated team working and effective communication (Clarke et al., 2017). Standardized training to become a general builder does not exist, which has an impact on the ability of those individuals to take a “whole house” approach to energy performance and related issues such as moisture movement and indoor air quality (Maby and Owen, 2015).

One development, undertaken in light of the skills gap, is the Sustainability Training Guide (CLC, 2017) produced by the Construction Leadership Council. The Guide sets learning outcomes for construction teams including trades, organized under themes of low energy building, sustainable products, waste reuse and recycling, water and whole build processes. The Guide is intended to be used for the development of content for standards, qualifications, apprenticeships and training courses but is not mandatory.

The British construction industry has been described as suffering with low skills and job insecurity due to casual and self-employment of many workers, low levels of initial training, the reliance on goodwill of contractors to take on trainees and the need to learn on-the-job (Clarke and Wall, 1998). This low skills–low innovation equilibrium is difficult to shift. As an example, a lack of energy performance-related training and knowledge is one area contributing to the performance gap – the difference between designed and actual energy consumption in use (Zero Carbon Hub, 2014). Furthermore, culture and embedded behaviors are not always aligned to enable the delivery of designed buildings and teams may be unaware of the role they play (ibid).

Construction education is still heavily influenced by the technical knowledge and requirements, vital to ensure precision and efficiency. However, it is important to take a practical view and consider the whole-building system together with related factors which will affect building performance, such as economics, management and motivation, rather than focusing separately on individual aspects that form the physical building (Scott, 2016). Construction education needs to integrate an understanding of new ways of working, and perhaps new types of business model, which have previously been perceived as uncompetitive by a highly competitive industry with established relationships (Loosemore, 2015). Previous work has explored the middle-out requirements for building professionals acting within this space (Janda and Parag, 2012; Owen et al., 2020). To deliver desired outcomes from sustainable renovation, Killip et al. (2020) suggested an approach to include routine post-occupancy monitoring of sustainable renovation projects to inform future work.

To explore further the integration of social, economic and environmental factors, the work of Godfrey (2010) provides a framework that integrates the “Triple Bottom Line” (Elkington, 1997) with systems thinking. Both Elkington (1997) and Godfrey (2010) recognize that to achieve sustainable development, new types of economic, social and environmental partnerships are needed. The integration of this framework and the issues highlighted by stakeholders is further discussed in the next section, Approach.

APPROACH

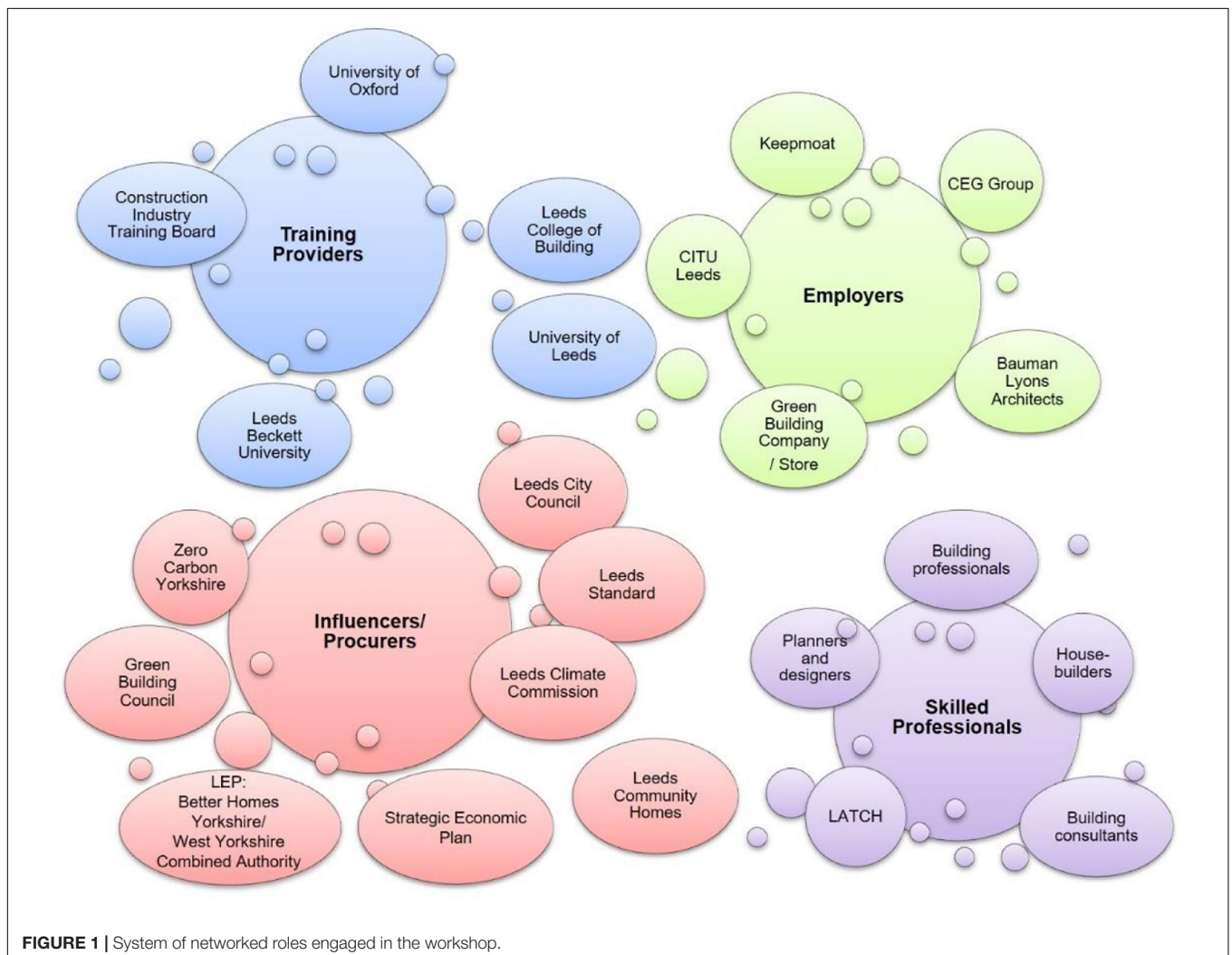
A pragmatic approach was taken to developing, running and analyzing a workshop gathering a range of networked professionals across a city construction industry system, enabling a focus on the questions of the research (Scott, 2016). The workshop was held in Leeds in January 2018, with two follow-up meetings on the themes of “social value” and “building performance” which emerged from the discussions. The workshop attendees are summarized in **Figure 1**. Specific organizations are loosely associated with one of four groups: training providers, employers, policy influencers and procurement staff, and skilled professionals, although in practice participants moved between groups and displayed different perspectives based on their individual backgrounds, experiences and current projects.

The desire to draw on expertise and insight from a local system of networked professionals stems from theories of the Triple Bottom Line (Elkington, 1997), developed with systems thinking by Godfrey (2010). Sustainable development includes social,

economic and environmental factors in addition to technical and political. Progress toward a sustainable society requires multiple disciplines to work together which adds complexity and requires consideration of the scale of change across project, business, societal and ecosystems.

The workshop captured a variety of stakeholder requirements and posed questions including “what skills are needed?”; “what are the challenges?”; “opportunities?” and “incentives required?” Information was gathered using post-it notes and pro-formas completed by attendees and notes taken by the research assistant.

The selection of questions and stakeholders was informed by two research projects; GLIDER and TRUE. GLIDER (Governance of Low Carbon Innovation in Domestic Energy Retrofits) had previously identified a skills gap and lack of vocational skills training for construction workers involved in low energy retrofits. TRUE (Transformational Mapping for Urban Environments) explored ways in which key stakeholders can work together to deliver city-wide solutions to social and technical challenges, including sustainability and low skills.



INSIGHTS

Workshop participants identified two main themes where training and capacity building was required, if ambitious targets for sustainable renovation were to be achieved: “building performance” and “social value.” These two themes align with part of the “environment” and “society” aspects of the “triple bottom line,” with building performance also arguably making a contribution to the “economic” aspect of a triple bottom line assessment. “Building Performance” encompasses the physical performance of the building fabric and what this means for energy and resource consumption when the building is in use. “Social value” is most readily understood as a range of actions which generate economic or community benefit. These themes connect in that as we improve building performance (reducing energy demand, improving energy efficiency and also potentially improving indoor air quality through effective ventilation as part of energy management), human health risks decrease and comfort can improve; jobs and wider economic benefits can be created.

Within each of the two main themes, a range of questions were explored including what should be in the curriculum for learning in these two areas, and what training routes would make such learning effective. The insights gained from the stakeholder workshop and further explored within follow-up meetings are summarized in **Table 1** (developed from Simpson et al., 2018) and discussed further below.

Content of Training

The triple bottom line framework integrating social, economic and environmental benefits, in addition to political engagement and technological change is the framework that offers a valuable perspective to reflect on content shared.

The building performance theme focuses on developing an understanding of why building performance is important and how the details of installation impact on the outcome of this. Training here would include an overview of the impact buildings have on the environment, human comfort and health; which are two factors from the triple bottom line. The targets for buildings could include measuring building performance in use which would then drive the detailing during renovation. Practical learning would include examples of junctions and how to ensure insulation is installed whilst enabling a continuous layer and minimizing the thermal bridging between internal and external surfaces through items such as fixings, lintels and window sills. The factors contributing to good indoor air quality would be covered including ensuring adequate ventilation in air-tight designs.

Whilst the content of any training for “building performance” and “social value” will differ, there are commonalities. For example, providing training on whole-house building performance with a particular focus on creating healthy indoor environments would also deliver social value to the occupants.

Who Should Be Learning?

The need to learn about both building performance and social value crossed many roles in sustainable renovation.

For social value, there was a sense that everybody in a project team, either during initial training or through continuous development, should understand the social impacts of their work. For building performance, there was a focus on the professionals physically installing technologies and those managing the work or overseeing construction practice. While each trade professional would not need to practice all of aspects of technical learning in their daily roles, an overall understanding of how the building functions should assist them in understanding the building as a system and amend their work practices accordingly. For example, this could prevent an electrician breaking an air-tightness layer as they would understand how the whole building system operates. Such understanding could allow these individuals to offer additional value – economic and environmental- when speaking to clients and householders. The role of a “clerk of works” – an individual carrying out onsite supervision, quality control and problem solving throughout a project – was discussed and enthusiastically supported as a role which should be routinely deployed on projects. At present, a “clerk of works” is not always employed on projects but they can oversee every step of the build process and ensure quality, workmanship and safety of construction practices, again, addressing economic (cost), environmental (carbon) and social (health and safety) aspects of the triple bottom line of a project.

How Should Training (and Learning) Be Delivered?

A mix of training approaches were discussed. For both building performance and social value, most participants felt the knowledge and skills development should be embedded in both formal and informal training, including on-site approaches. For example, initial formal construction training, as part of apprenticeships or similar, in sustainable construction and renovation should be the norm but should not end there. For upskilling and continuing development of existing professionals, informal on-site routes such as tool-box sessions were suggested for project teams. Short, intense, subject-specific training could be included within continuous professional development and included in professional (re) accreditation processes. Participants made the point that any training offered would need to help construction workers to exceed the minimum standards set out in current building regulations if ambitious zero carbon goals are to be achieved.

On-the-job training is the method of training most frequently funded by industry employers (CITB, 2016), and examples where on-the-job training has worked in Leeds were shared by the workshop participants. One example was the site staff training scheme for the Stamford Brook project, during the construction of 700 cavity wall dwellings on a National Trust estate, provided knowledge and skills for building low-carbon, air-tight dwellings (Roberts et al., 2005). The training included thermal bridging detail with illustrative examples. This was provided as part of an exchange where those on site also provided in their own ideas for how to improve buildability or reduce costs. This training was

TABLE 1 | Summary of insights for “Building Performance” and “Social Value.”

	Building performance	Social value
<i>Content themes</i>	Overview of wider impacts resulting from building performance: climate change, CO ₂ emissions, human comfort and health (overlaps social value) What building performance targets are trying to achieve Practical issues and “principles” such as continuity of insulation, thermal bridging, air-tightness, ventilation and air-flow Measuring building performance	Communication skills Digital communication Awareness of other trades’ practices Understanding the whole-house system Understanding of the whole lifecycle of buildings Material choices and how they affect construction practices Respect for quality Responsibility and Sustainable Development Goals Collaborative procurement routes
<i>Who should be learning?</i>	Builders and trades professionals Managers of projects	All levels and roles including wider influencers and procurers
<i>Delivery approach suggestions</i>	On site: tool box courses Formal: embedded within mainstream construction training Continuous professional development: short intense courses for specific elements	On site: on socially innovative projects Formal: embedded within mainstream construction training Continuous professional development: short intense courses for specific elements
<i>Opportunities</i>	Embedding within existing training Project delivery teams can require training to contract teams, especially local authority clients Construction Skills Certification Scheme can include “Gold” standards Enabling householder demand for skills	Embedding within existing training Within new construction training programmes Soft Landings could link building performance to social benefits
<i>Incentives</i>	Stringent targets enforced through Building Regulation League tables on building performance achievement	The promise of more work Motivation via understanding lifecycle thinking

reported as one of the major successes of the project; operatives found it interesting and useful (ibid).

Secondly, the housing charity Latch (Leeds Action To Create Homes) found that using an approach that integrated social value into a renovation project of a Victorian terrace in Leeds, resulted in better measured performance than a renovation of a neighboring property of the same type carried out with Green Deal approved installers and measures (Latch, 2014; Gorse et al., 2017). The difference was reported to be due to the “whole-house approach” taken by Latch and valuing the time needed to achieve good performance, whilst keeping material costs down (Gorse et al., 2017).

Opportunities and Incentives

Incentivizing training is vital since taking time to upskill a workforce costs money and requires motivation for both employer and employee. Without the opportunity of a project to practice the skills gained, it is difficult for potential trainees to see where these skills could be applied and value the time spent in training. As the construction industry, and specifically renovation, progresses through changes in regulatory standards those installers equipped to deliver buildings which perform as designed should be better placed to continue winning more local work. All tradespeople already need to possess a Construction Skills Certification Scheme (CSCS) card so one approach could be to encourage a system where contractors who work in low-carbon renovation carry a “gold” standard card acquired through additional training, recognizing the additional value – environmental, social, economic – that their enhanced knowledge allows them to generate in their work. Once this kind of accreditation is recognized by clients, often householders, it could lead to advantages in winning higher value work. Local reputation of firms and the workers in those

firms could be boosted through the use of league tables or other external recognition. There is the potential for regulation to lead to changes in practices; local standards such as the Leeds City Council Voluntary Standards on Sustainable Design and Construction (“The Leeds Standard”) have been developed to equip developers and design teams with knowledge to exceed minimum requirements on the Building Regulations (LCC, 2011). This exceeded minimum requirements in the building regulations. The Leeds Standard was criticized by some developers and construction contractors who perceived it would inflate construction costs and cut margins, making projects undeliverable.

This section has shared insight on broad training content themes, who should be training, how this should be delivered with previous examples, and incentivized, to deliver economic, environmental and social benefits, both during training and through sustainable renovation outcomes. The following section discusses the insights and concludes the article.

DISCUSSION AND CONCLUSION

Economic benefits stem from job creation (Loosemore, 2015; Maby and Owen, 2015; EC, 2020), social benefits are created through having better quality places to live in Loosemore (2015) and the environmental benefits are the result of more sustainable buildings (ibid; Godfrey, 2010). The themes which emerged within the workshop “building performance” and “social value” both provide economic, social and environmental benefits.

Bringing together multiple stakeholders who can influence the delivery of sustainable renovation training enabled a rounded discussion on local strategy and examples of projects. This further allowed information to be shared on what had worked

well in previous projects and potential routes to incentivizing further training. Approaches to enhancing skills and knowledge across the spectrum of roles in renovation were discussed. Both social value and building performance skills and expertise were considered important across the sector from trade professionals to management teams.

Delivery approaches including on-site, informal and formal training routes were shared. The experience of projects, such as on-site methods, enabled stakeholders to reflect on their success. Overseeing detailed installations and guiding teams on-site appeared to work well on two projects shared by attendees. Engagement with training providers allowed detailed discussion on training content with stakeholders who could envision how new themes could be incorporated into formal training delivery. Aspects of building performance and social value could be described and considered in relation to existing training, and potential to advance this and learn from local case studies.

Training could be incentivized through combining local top-down and bottom-up demand which local stakeholders can influence and aid in setting requirements for. Enforcing training certification on projects, in contracts or through certification schemes or league tables were discussed. Local projects enabling skills to be deployed could motivate teams to engage. The stakeholders engaged could enable some of these incentives shared, through further work to implement actions discussed.

Skilled professionals and employers in the workshop shared challenges they have seen in working on projects and how skills gaps have affected project delivery. They discussed on the role of a “clerk of works” to oversee construction practice and observed that in practice physical construction work is often not closely overseen. This led to a strong consensus that routinely deploying the “clerk or works” role would assist meet sustainable renovation targets.

This paper reflects on engagement with a system of networked professional stakeholders who influence and procure renovation work, employ construction teams, train construction professionals or work on sustainable renovation projects. An effective local approach to retrofit needs to use the insights offered by this kind of group of stakeholders and this offers an opportunity co-create a cohesive, area-specific plan. Sustainable renovation can lead

to economic, social and environmental benefits as well as technology and political innovation. A systems approach (Godfrey, 2010) is helpful in considering how this change can be enacted within a local area context, across sector and disciplines.

This reflection aims to serve as a basis for further research, local area action and policy engagement. Bringing together stakeholders to identify requirements for sustainable renovation training and delivery enabled practical discussion and local examples to be shared. A local approach that engages stakeholders is recommended to ensure cohesive delivery of sustainable renovation training to deliver projects leading to economic, social and environmental benefits.

AUTHOR CONTRIBUTIONS

KS was the lead author. KS and AO conceptualized the work and edited the manuscript. AO led the project. Both authors contributed to the article and approved the submitted version.

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