Social Housing Providers as Unlikely Low-Carbon Innovators

Jenni Cauvain¹ and Andrew Karvonen

Abstract

Social housing providers have recently emerged as unlikely innovators of low carbon transitions in the UK residential sector. They tend to have a significant amount of influence over large housing stocks, opportunities to access funding to retrofit on a large scale, can make explicit connections between reduced carbon emissions and improved quality of life for low-income residents, and foster a close relationship with the place and communities they serve. In effect, social housing providers are ‘middle actors’ who not only facilitate but also realise low carbon transitions through various strategies. This paper uses empirical findings from interviews with social housing providers in Greater Manchester to understand the different ways that low carbon and energy efficiency innovation is being undertaken in this sector. The findings reveal that as middle actors, social landlords influence upstream to policy makers and regulators, downstream to individual households, and sideways to other actors in the social housing sector as well as to other building and energy professionals. The findings reveal opportunities for governments to supplement their existing policies with recognising and supporting middle actors to accelerate low carbon transitions of the built environment.

Keywords Social housing; innovation; energy; low carbon; retrofit

1. Introduction

Housing accounts for about a third of all energy consumption in the UK, with space and water heating comprising 80% of domestic use (DBEIS, 2017). Therefore, housing is an important target for low-carbon transitions. However, the existing housing stock is resistant to change due to a disconnect between top-down energy efficiency policy agendas and bottom-up behavioural change initiatives as well as multiple challenges in retrofitting the built environment (Hoffman and Henn, 2008; Ravetz, 2008; Bergman and Eyre, 2011; Karvonen, 2013; Swan and Brown, 2013; Hodson and Marvin, 2015). In this respect, Kivimaa and Martiskainen (2018: 31) note that, ‘Innovation and diffusion in the building sector are difficult due to a variety of factors making the current regime very stable.’

¹ Corresponding author:
School of Sociology and Social Policy, The University of Nottingham
University Park, Nottingham, NG7 2RD, United Kingdom

This paper characterises registered social housing providers (RPs) as unlikely but yet important innovators in low-carbon retrofit. They are conceptualised as ‘middle actors’ (Janda and Parag, 2013; Parag and Janda, 2014) in low-carbon transitions of the built environment. By leveraging various forms of agency and capacity, middle actors have the potential to accelerate and diffuse innovations from within their organisations in different directions. This contrasts with the more widely-acknowledged low-carbon intermediaries that occupy ‘in between’ positions to connect organisations and agendas. The middle out perspective (Janda and Parag 2013; Parag and Janda 2014) helps to explain how RPs have emerged as unlikely innovators in low-carbon transitions while operating in the challenging context of social housing in the UK.

In their housing retrofit activities, RPs follow a sociotechnical approach to the built environment that recognises energy and society as co-constitutive (Guy and Shove, 2000; Guy, 2006; Sovacool, 2009). RPs as middle actors in the low-carbon agenda also highlight the socio-political nature of sustainability transitions and provide empirical insights into how urban innovation is governed (Bulkeley *et al.*, 2011; Bulkeley and Castán Broto, 2013; Joss, 2015). Focusing on agency and capacity, the findings reveal that RPs have multiple motivations and strategies of influence to combine low-carbon innovations with their pre-existing commitments to social housing provision. This paper depicts how a range of external pressures created a ‘perfect storm’ for RPs who turned to low-carbon innovation to secure a more sustainable future for their business model. In the UK, these pressures included austerity (Hodkinson and Robbins, 2013); long-standing political prioritisation of private home ownership and capital accumulation over socially rented housing (Edwards, 2016; Smyth, 2016); and the volatility of ‘green’ policies which support the uptake of low-carbon innovations in the built environment (Walker *et al.*, 2016). The findings point to the need for policies and incentives to support the potential of RPs and other middle actors in the built environment.

The paper begins with a brief background on energy efficiency and social housing in the UK. Then the theoretical framework of middle actors is described and applied to RPs. The methodology for empirical data collection is described followed by a discussion of findings that summarise four

different roles of RPs as sectoral innovators, social innovators, process innovators, and civic innovators. Each role is informed by different combinations of RP agency and capacity and entails different directions of influence (upstream, downstream and sideways). The paper concludes with some reflections on the findings, and implications for policy, as well as suggestions for future study.

2. Energy efficiency and social housing in the UK

Improving the energy efficiency of the social housing stock is a quintessential example of addressing the three ‘E’s of sustainability (environment, equity and economy) (Opp and Saunders, 2013). Unlike the commercial building sector where energy consumption is a relatively minor financial consideration (Goulden and Spence, 2015), energy bills are a significant expenditure for low-income tenants in social housing. RPs are frequently concerned with the ability of their tenants to pay their energy bills to maintain comfortable and healthy living conditions, while also having sufficient income to cover basic necessities such as food and rent (Cauvain *et al.*, 2018). Thus, there are clear linkages here between carbon reduction and social equity.

Meanwhile, RPs have the potential to achieve large-scale results because their housing stocks are typically geographically co-located and owned and/or managed by a relatively small number of stakeholders. This is in stark contrast to private rental and home ownership that is highly fragmented. At the end of 2016 there were approximately 23.7 million dwellings in England; in terms of socially rented dwellings, 1.6 million (6.8%) are owned by local authorities and 2.5 million (11.8%) by private registered providers or other social landlords, the remaining 19.5 million dwellings (82.3%) are in private ownership, either rented or owner occupied (MHCLG, 2018a). The latest data from the social housing regulator lists 1717 registered providers nationally (Homes and Communities Agency, 2018). In Greater Manchester (GM) there are 26 RPs at the time of writing. Cauvain and colleagues (2018: 7) state that the social housing sector “is made up of historically independent social landlords and landlords with accommodation that is owned or previously owned by the local GM authorities. The latter dominate the sector with a ratio of 3 to 1”. Because it is dominated by (former) local authority stock, there is a close relationship with place and community in the social housing sector.

Local government actors and utility companies have targeted social housing as a prime opportunity to realise decarbonisation targets through energy efficiency measures (Cauvain *et al.*, 2018). The bulk of these programmes were delivered under two schemes that ran from 2008 to 2012: The Community Energy Saving Programme (CESP) and the Carbon Emissions Reduction Target (CERT). Both programmes were later replaced by the Energy Company Obligation (ECO) where operating principles were markedly different (Ofgem, 2017). As a result of collaborations with the utility sector, first under the energy efficiency and latterly carbon reduction targets, together with the opportunities provided by the government-backed Feed-In-Tariffs and Renewable Heat Incentive, many RPs emerged as innovators and front runners in designing and delivering systemic low-carbon retrofits to their domestic building stocks (Davies and Osmani, 2011; Karvonen, 2013; Swan *et al.*, 2013). The research in this paper builds upon this work by focusing on the retrofit experiences of RPs during the CESP and CERT programmes, although the examples given also include small-scale pilots and experiments funded from other sources.

Despite being well-positioned to innovate, RPs are *unlikely* low-carbon innovators for two reasons. Firstly, the sector is governed by an ever-changing national policy and regulatory framework in a strongly centralised UK system of governance, against a backdrop of historic lack of investment in the social housing stock (Hodkinson and Robbins, 2013; Smyth, 2016). There is a stigma of deprivation and decline associated with social housing estates (Hastings, 2004). Despite this reputation, the social rented stock has emerged as the most energy-efficient tenure in England. The most recent survey of the English housing stock reveals that 48% of dwellings in the social rented sector had an energy efficiency rating of A to C, compared with 26% in the private rented sector and 24% of owner occupied homes (DCLG, 2017). Improvements in the social rented stock were particularly notable in the last ten years because of the top-down carbon and energy efficiency policies cited above, as well as, the authors argue, the innovations that emerged from within the sector itself.

Secondly, RPs are unlikely innovators because they are obliged to balance the needs of their low-income tenants and their specific business model for providing affordable housing with policy objectives of carbon reduction. Social housing is part of a complex and fast changing policy environment in the UK. Energy performance and carbon emission reductions are only two among many urgent and competing priorities in the provision of social housing. A cursory glance at social conditions of the UK in 2017 reveals an exponential rise in the use of foodbanks since 2008/9 (Trussel Trust, 2017), continued rise in homelessness and a perpetual housing crisis due to an inadequate supply of socially rented housing (Edwards 2016; Smyth, 2016; Fitzpatrick *et al.*, 2017). Despite this tumultuous environment, RPs have emerged as key players in carbon and energy governance in buildings, and in this respect, enjoy a new status as champions of sustainable transitions.

3. Social Landlords as Middle Actors

The importance of intermediaries in realising low-carbon futures has been developed over the past decade in fields including environmental governance (Medd and Marvin, 2008; Moss, 2009; Guy *et al.*, 2011), sustainable transitions (Geels and Deuten, 2006; Bush *et al.*, 2017; Gliedt *et al.*, 2017; Kivimaa and Martiskainen, 2018; Martiskainen and Kivimaa, 2018) and climate experiments (Matschoss and Heiskanen, 2017). Intermediaries occupy an ‘in between’ position connecting the top (government) and the bottom (individuals) and serve as a bridge between structure and agency. With respect to decarbonisation agendas and housing, Karvonen (2013: 571) notes that ‘intermediaries bridge the gap between distant government carbon reduction targets and the rhythms of domestic life.’ These individuals and organisations join up the ambitions for a low-carbon future with actual conditions on the ground.

Regarding energy efficiency and the built environment, the role of intermediaries has been highlighted with respect to housing retrofit (Karvonen, 2013, 2016, 2018; Janda *et al.*, 2014), community energy (Hargreaves *et al.*, 2013, Bird and Barnes 2014), commercial buildings (Goulden and Spence 2015; Watson, 2015), and low-energy housing (Grandclement *et al.*, 2015; Kivimaa and

Martiskainen, 2018; Martiskainen and Kivimaa, 2018). Intermediaries are important actors in the built environment because of their abilities to connect different agendas to facilitate energy efficiency and renewable energy agendas along the chain of energy stakeholders. While a handful of UK policies have specifically been directed at these intermediaries (e.g. Community Green Deal (DECC, 2013)), most policies have continued to embody top-down regulations and incentives or bottom-up behavioural change measures.

Examples of intermediaries in the energy sector include national and local government departments, third sector organisations (e.g. Energy Savings Trust, Communities and Climate Energy Alliance), community groups (Carbon Coop, Retrofit for the Future), energy efficiency experts and others (Hargreaves *et al.*, 2013; Karvonen, 2016). These actors have a significant influence on energy consumption of buildings and can facilitate low-carbon transitions through technical, financial, policy, managerial and other routes. In this research, the authors encountered many directly employed or contracted building and energy professionals who serve as low-carbon intermediaries in the social housing sector. Such roles included caretakers, energy advisors, maintenance and repair staff and contractors, sustainability officers, customer engagement officers, as well as a range of external consultancies and experts involved in the large-scale retrofit programmes. However, when considered from an institutional perspective, RPs as agents of change have more agency and capacity than their intermediary colleagues.

More recently, Janda and Parag developed the notion of ‘middle actors’ to complement rather than replace intermediaries (Janda and Parag, 2013; Janda *et al.*, 2014; Parag and Janda, 2014). They argue that middle actors occupy the same space as intermediaries but that they ‘are actors in the system and have more agency and capacity than intermediaries’ (Parag and Janda, 2014: 110). In other words, they are not simply go-betweens or brokers but also have the ability to make changes in the sociotechnical system of energy production and consumption. Middle actors provide a more comprehensive perspective on sociotechnical transitions of energy and buildings because they have an organisational presence and purpose that precedes the low-carbon agenda of the UK government. As

such, they have taken on the low-carbon agenda rather than being created with the express purpose to push it forward. As Goulden and Spence (2015: 281) note, ‘The middle shapes both supply and consumption of energy within buildings, making it an essential component in any process of transition.’ They play an *agentive* rather than *facilitative* role in realising low-carbon transitions by leveraging their agency as well as capacity. In this paper, the authors conceptualise RPs as middle actors by emphasising their institutional role.

With respect to middle actors, agency is defined as the willingness of actors to make their own decisions while capacity is their ability to act upon those decisions (Parag and Janda, 2014). Agency and capacity are necessary for actors to make decisions and act independently within systems that are sociologically understood as ‘structure’. In this paper, structure refers to the policy and regulatory frameworks for the governance and financing of social housing, energy and carbon governance, as well as the cultural and social norms that influence occupant perceptions and decisions about domestic energy consumption. Middle actors have upstream influence to policy makers and funders, downstream influence to building owners and occupants, and sideways influence to other actors in the built environment sector (Janda *et al.*, 2014). They employ multiple strategies to negotiate structural constraints, and here the institutional perspective on RPs points to their role within wider structures that they can negotiate and influence as middle actors.

Previous examples of middle actors include congregations, building professionals and facilities managers (Parag and Janda, 2014; Goulden and Spence, 2015; Grandclement *et al.* 2015; Wade *et al.*, 2016). Janda and colleagues (2014: 932) argue that ‘due to their position between top and bottom actors, middle actors play crucial functions in the transition process from a high-carbon society to a low-carbon one.’ RPs serve as a previously unrecognised example of middle actors that facilitate and enact low-carbon futures. They occupy a middle ground between those government bodies that prescribe regulations and policies to reduce energy consumption in the built environment and bottom-up initiatives of behavioural change that attempt to influence how tenants use energy in their houses. The activities of RPs embody multiple ways of combining agency and capacity in to forward low-

carbon objectives while meeting their obligation to provide housing to low-income individuals and families.

4. Methodology

To understand the agency and capacity of RPs as middle actors, 13 semi-structured interviews were conducted with RPs and low-carbon policymakers in Greater Manchester, UK between September 2013 and October 2014. At the time of writing, there are 26 RPs currently listed in the Greater Manchester Housing Providers group. The interviewees represented seven organisations; five independent RPs (RP1 to RP5) and two local authority housing departments (LA1 and LA2).

Interviewees were selected according to a purposive sampling frame that identified those organisations and individuals who delivered notable retrofit schemes or completed other significant energy-related interventions among their housing stocks and tenants. In other words, the interviewees self-identify and are recognised as regional frontrunners in realising low-carbon social housing.

Interviews were conducted in person and were audio recorded. Audio recordings were transcribed and the first author coded the transcripts to identify different modes of agency and capacity. Interview quotes were anonymised to encourage candid responses from the respondents and to protect them from any potential negative outcomes of participating in the study.

After the interview data was transcribed and analysed, a workshop was held in Manchester on 6 October 2014 with 24 representatives from RPs, retrofit contracting companies and local authorities. The workshop provided an opportunity to present the results of the interviews and to provide an opportunity for discussion among the stakeholders. Notes were taken during the workshop discussions to corroborate the interview findings, and to situate the work in the broader activities in the social housing sector. As a whole, the findings are representative of the approaches taken by low-carbon RP frontrunners, but cannot be extrapolated to every landlord in the social sector.

5. Four innovation roles for RPs

The findings from the interviews suggest that RPs play four innovation roles as middle actors. By combining their agency and capacity in different ways, RPs identify synergies and opportunities between social housing provision and low-carbon ambitions. The following subsections summarise the roles of sectoral innovation, social innovation, process innovation, and civic innovation. These roles are not exclusive and instead, are overlapping and mutually supportive. The interviewees tended to fill several of these roles simultaneously.

5.1. Sectoral innovation

One way that RPs function as middle actors is by aligning various agendas, including safeguarding the wellbeing of tenants, ensuring the future viability of social housing sector, planning for rising energy costs, anticipating future CO₂ regulations, and addressing tenant expectations for more optimal building performance. All of the interviewees expressed normative aims of addressing fuel poverty and debt while simultaneously ensuring the long-term sustainability of the social housing sector. In effect, they recognised that it was their responsibility to ‘future proof’ the social housing sector to ensure that vulnerable populations would continue to have access to adequate and affordable housing in the future. RP2 summarised this approach as follows: ‘Think about future proofing, think about kind of upping the spec to take account of CO₂ targets in, you know, going forward.’

This involved the creative alignment of low-carbon and social housing agendas as well as careful prognostication and planning to anticipate and prepare for future conditions. For example, RP1 predicted that rising energy prices and fossil fuel dependency will create significant operating and cost pressures for social landlords as well as their tenants in the future. He noted, ‘We will probably end up with more people ... being fuel poor than we did ten years ago, because the price of energy is pushing people into fuel poverty ... that will happen across the UK...’ This reflects a long-term perspective to protect low cost social housing provision as a public service. The same RP noted that to protect their business model, they converted the district heating system in a tower block to biomass, and that without this intervention, ‘Tower blocks would have had to have been knocked down. Where

do you house five hundred people?’. Thus, low-carbon retrofit activities have direct implications on the long-term sustainability of the social housing sector.

RP4 described a similar strategy to reduce fuel poverty while ensuring business viability for the future: ‘... the priority was really on that, on trying to reduce fuel poverty for our tenants and ... in the long run make them more sustainable and lettable because people, ... in the future will be looking at ... how energy efficient the property is when they're deciding ... whether they're going to rent it or not, in the same way that people do with cars now.’ This reflects the long-standing trend to apply market principles to the provision of social housing (Ginsburg, 2005). It also suggests that policymakers and tenants have rising expectations about the quality of social housing and will no longer accept dilapidated, sub-standard conditions. Indeed, stock condition and energy performance have been leveraged by successive UK governments as an excuse to privatise social housing (Cauvain *et al.*, 2018). These sectoral innovation practices reflect the intrinsically political nature of energy and low-carbon transitions (e.g. Baker *et al.*, 2014; Walker *et al.*, 2015, 2016) and RP attempts to fold this into their housing stock management philosophy.

Sectoral innovation can also extend beyond the social housing sector to influence the larger building sector. RP5 described how energy efficiency and low-carbon activities by RPs can influence the retrofit market and government policy, stating, ‘so the view was that if social housing can impact on things, I guess for example, eco funding... solar panels, anything like that, if you could get all your landlords working together we'd have a far greater impact on both the market and Government decisions, that kind of thing and eventually... that will filter through to the private sector.’ Here, the RPs recognised that they were frontrunners in the broader practices of housing provision and could demonstrate the efficacy and advantages of housing retrofit. Such a perspective goes well beyond their typical remit to house low-income and vulnerable populations.

Sectoral innovation is about ensuring that the provision of social housing is fit for purpose for the twenty-first century. Here, there is a recognition that RPs need to embed resilience in the business

model to adapt to austerity measures and decreases in public funding as well as the pressure on tenants in the future due to rising energy costs. Sectoral innovation focuses on securing a long-term business model that will allow RPs to continue their central mission of providing housing to the most vulnerable members of society. The direction of influence for sectoral innovation is sideways to RPs and other housing sector stakeholders as well as upstream to local and national governments that are continually modifying housing policies.

5.2. Social innovation

RPs also strive to change the way that their tenants use energy. Here, there is an explicit focus on bridging the gap between those who design, construct and manage the built environment and those who inhabit it. RP3 recognised that low-income residents do not always receive all of the benefits of energy retrofits: ‘we’ll do a massive scheme of million pound boilers put in place and kitchens and we’ll fit them and walk away and not do anything with it, you know, not tell them how to work it, tell them to get the best out of that.’ This reflects the understanding that energy use in the built environment is a sociotechnical endeavour and the building occupant is a key stakeholder in realising energy-efficiency goals (Horne and Dalton, 2014). RP2 placed a high value on fostering good relationships with tenants and building trust, seeing this as a cornerstone of achieving behavioural change and energy awareness: ‘I just realised quite early in that what was really important was to build the relationship with them ... and there was a lot of visits in the early stages, a lot of kind of troubleshooting of, ooh, the joiner said he’d come back and do this and he didn’t, so there was a lot of kind of building that relationship.’ Thus, RPs frequently develop and conduct educational and behavioural change programmes for their tenants. RP5 summarised this role, stating that ‘our key goal is to try and help tenants reduce their fuel bills.’

These educational activities can be ongoing or can be staged at ‘trigger points’ such as during the handover process after a low-carbon retrofit has been completed (Darnton *et al.*, 2011; Energy Saving Trust, 2011). RP4 described a personal approach of the handover process aimed at ensuring the effectiveness of the energy-efficiency upgrades. He noted, ‘there’s a lot of information provided to

tenants when we hand new properties over whether they be refurbished or re-improved and we do try and make a good effort to engage with the tenants and speak to them face-to-face because often that can make the difference.’ RPs also undertake tenant education by training staff and hiring external contractors to serve as energy advisors. For example, RP2 hired a local non-profit organisation to work as energy doctors and conduct household visits to educate tenants about how to save energy. Similarly, RP1 used energy advisors to complement physical retrofits of their housing stock, stating: ‘[We have] two energy advisors that are there to advise on these kind of issues, putting energy monitors in, talking to [tenants], looking at fuel bills.’ These educational efforts are an attempt to enrol tenants as co-managers of the housing estate.

In some cases, education efforts can also expand beyond energy issues to include whole-house management. RP5 described an electric heat pump pilot project where participating households received broadband service, a tablet and digital literacy training to operate the new heating system. He noted that ‘as a sort of incentive, we’re offering people two years free broadband, we’re also going to train them to use the tablets, not just for this project but also how to access their rent account, how to order a repair.’ This recognises that energy consumption is related to other issues of household management such as maintaining and servicing the property, managing monthly bills, and so on.

Beyond information packs and expert advice, the interviewees also used demonstration houses to educate their tenants. Demonstration houses (either occupied or unoccupied) provide a space where tenants can witness and discuss energy innovations *in situ*. RP3 described a retrofitted demonstration house and explained: ‘we always wanted to stay open for at least a twelve-month period as an educational centre, for obviously our [green] champions where they could then give advice to people and also for the wider community.’ RP2 took a different approach and enrolled three tenants to use their recently retrofitted houses as demonstrations of different energy efficiency measures. Other tenants were invited to visit and ask questions. RP2 noted that the hosts ‘can tell other people what worked and what didn’t work in real life.’ This suggests a mode of peer-to-peer education where low-carbon transitions are based on conversations and mutual understanding.

Social innovation involves the direct or indirect engagement of RPs with their tenants to bridge the gap between the built environment and lived conditions. It recognises that tenants are key in realising the predicted energy efficiency gains and carbon emissions reduction of a particular retrofit. Moreover, it ties in energy consumption with broader domestic management practices and recognises the importance of implicit and often overlooked embeddedness of energy in the day-to-day inhabitation of houses. Rather than being passive receivers of upgraded housing, the tenants are understood as co-managers of energy and carbon emissions from the built environment. The direction of influence here is largely downstream to tenants but can also be sideways to other RPs who are interested in engaging their tenants in everyday energy practices.

5.3. Process innovation

A third way that RPs innovate in low-carbon transitions is in the retrofit process itself. Retrofit activities are complicated and involve a wide range of stakeholders and funding programmes with different objectives and expectations. RP1 described how his organisation strategically aligned different funding opportunities to maximise the benefits of retrofitting their housing stock: ‘The schemes that we got 76% external funding for to deliver biomass are also eligible for the Renewable Heat Incentive.’ This requires in-depth knowledge of different funding schemes and creativity to identify synergies that can create a cohesive package. They also identified opportunities to use low-carbon funding to supplement existing internal building improvement activities. RP1 noted that ‘we had the funding to do the energy measures, now part of the energy measures were over-cladding of the blocks ... while they've got scaffolding up, we've changed windows, we've upgraded the windows into more thermal efficient and safer windows, and that doesn't attract a great deal of funding, so we had to pay that out of the [internal] budget.’ Combining energy-efficiency upgrades with other retrofit activities not only saves money but also reduces disruption to tenants.

The interviewees also innovated in the retrofit process by trialling new approaches to test their efficacy through pilot project prior to wider rollout. RP5 explained their approach: ‘we've done a lot

of desktop exercises and making sure that people aren't going to be any worse off, and that was quite important to us to be honest ... if the desktop exercise works and a couple of pilots we've done which have shown that the people are certainly ... making savings on their electric systems.' Here, the RP recognises the importance of testing new technologies and techniques *in situ* rather than relying on predicted performance.

And beyond their own housing stocks, the interviewees recognised the importance of sharing their experiences with other RPs. They realised that they all face similar issues and could benefit from a collective pool of expertise. RP3 describes a demonstrator house that was designed as a proof of concept of a typical 'hard-to-treat' Victorian terraced property to demonstrate what was achievable through retrofit: 'So we looked through all and found out what we also wanted from this was something that RPs, especially if they've got a DLO [Direct Labour Organisation, typically for repairs and maintenance] or a small handyman team, can look at actually fitting themselves on their void properties to keep costs down... all the hard to treat or solid wall properties.' This suggests that learning and knowledge exchange are central activities for RPs who are innovating in housing retrofit (Hargreaves *et al.* 2013). Process innovation extends beyond the social housing sector to influence the larger housing sector. RP1 reported that the large scale of their low-carbon housing retrofit activities created local supply chains that also serve the private sector. RP1 became an expert in many aspects of commissioning and delivering low carbon interventions and took on work for others. For instance, he noted that 'the council also chose to do 27 commercial [PV] systems, we delivered and designed them ... We used our supply chain to do that.'

Process innovation involves engagement with the latest policies and financial instruments as well as technologies and techniques to carry out stock improvements. This requires a commitment to interpreting the processes and identifying how they are related. RP1 explains: 'it's fair to say all of this funding ... it's a language we'd never heard of before and you have to have somebody that can dedicate time to understanding that, because if people don't understand it, right up to the senior level, people won't make decisions, it has to be understood.' Process innovation focuses on the 'doings' of

housing retrofit and the larger ecosystem of housing professionals and supply chains that together produce the built environment. It acknowledges that RPs have valuable expertise about the process of retrofitting that they can build up internally and spread throughout the social housing sector and beyond. There is a focus on shared learning processes where these actors can benefit from the experience of others to systemically upgrade housing stocks. The direction of influence here is largely sideways but also has the potential to go upstream to local and national governments.

5.4. Civic innovation

A final innovation role for RPs recognises that social housing is situated in particular contexts. All of the interviewees were sensitive to individuals and families that are tenants in their housing stock but also to the people who live and work in neighbouring properties. RP1 stressed the contextual character of housing retrofit and noted that, 'There's no one size fits all here, everything has to be designed, bespoke to that particular scheme, the tenants that live there, the orientation, the location, you know, all of the things are considered.' Thus, they function as civic innovators to fit the low-carbon interventions of the social housing sector into the larger community fabric.

Several of the respondents noted how their retrofitting activities extended beyond their housing stocks and into adjacent communities. RP5 described how the private housing sector benefited from a public housing retrofit scheme: 'when they did the CESP teams earlier, the big issue was trying to get the private sector to buy in and we would do a street for example, and there'd be a number of private [properties] on the other side of the road, that wouldn't have the capacity or the voice to access funding, and, we were able to bring them into our schemes as well.' LA1 described a similar situation where private properties were brought into a public housing retrofit scheme: 'We got funding, so that made a massive difference from going along to the row ... everybody had it done.... with the private rented and the owner occupiers we only did external fabric work, we didn't go inside... we did loft insulation but we didn't do internal wall insulation to the fronts of those properties. They had a choice, if they wanted they could, they could join into the scheme and they would have to pay for that.' These

activities served to blur the boundaries between different housing tenures and address the fragmented nature of privately owned housing (Ravetz, 2008; Karvonen, 2013).

Civic innovation recognises that housing retrofit is connected to the broader upgrade of the built environment. LA1 reflected this perspective: 'The biggest problem I had is that energy efficiency was only a fraction of what the project was about.... It's about renovating the full area, the streets, street lighting, pavements, roads, etc.' Thus, the low-carbon housing agenda is used to connect multiple elements of a particular neighbourhood. For example, RP1 recognised that they could not only upgrade their district heat network to biomass to reduce carbon emissions but also provide heating to the local school. The same respondent expressed an ambition to develop a locally owned and managed energy supply by harvesting and processing locally grown wood: 'it's trees ... we've got it in our borough, we've got access to supply chains as well ... there's an income because there's another arm of the business that [RP1] has developed but we've got fuel security ... We'll have our own locally sourced [energy supply]... It's true sustainability.' This recognises the indelible connections between the housing stock and energy systems. And finally, RP1 recognised retrofit activities as an opportunity to training local residents. He described an apprenticeship programme by partnering with their contractors: 'we're looking at working with things like long-term worklessness and maybe ex-offenders and things like that and giving them new skills.' Thus, upgrading and maintaining the housing stock provides multiple opportunities to build physical and social resilience into the community.

Civic innovation involves systemic change in a particular geographic area. Here, the social housing stock is recognised as part of a larger social fabric and the activities within the social housing stock in a given area are coupled with retrofit of private housing as well as upgrades to public spaces, streets, energy networks, and even into social programmes such as skills training. These processes can work downstream to tenants, sideways to community groups, and upstream to local and national governments. Civic innovation begins to develop a community of interest around the decarbonisation agenda that goes beyond the usual suspects of built environment professionals and policymakers. RPs

are particularly well positioned to carry out this civic innovation role due to their ethos and historically close relationship with the localities and communities they serve. Despite recent and ongoing mergers in the sector, social housing in the UK is predominantly associated with particular locations, unlike for example many commercial building developers or the utility sector, who might act as low-carbon intermediaries but without a specific connection to place. To illustrate this, in 1980, 94 per cent of social housing in the UK was rented from a local authority (MHCLG, 2018b), which means it was institutionally tied to local democratic processes. Smyth (2016: 213) argues that ‘council housing is woven into the fabric of British society, with democratic accountability relations at its heart via elected councillors.’ Successive UK governments have continued to privatise local authority owned housing. As a result, most social housing today has changed ownership from local authority to independent RPs (Smyth, 2016; Cauvain *et al.*, 2018). Whilst the accountability ties through local democracy have been weakened, many of the independent RPs reflect these original housing geographies. In the Greater Manchester context, this is predominantly the case.

5.5. RPs as Unlikely Low-Carbon Innovators

The findings of this research suggest that RPs innovate in four different ways as middle actors, as they work to upgrade the energy and carbon performance of their housing stocks. Sectoral, social, process, and civic innovation involve different combinations of agency and capacity and have influence in various directions. These dynamics are summarised in Table 1. RPs work towards their self-interest in protecting the social housing sector in the long-term and in improving the relationship with their tenants. They also recognise the opportunity to share their learning about housing retrofit with other RPs and building professionals to raise the level of competence in the wider system. And finally, they recognise that social housing is a community asset and retrofit activities can spread beyond the RPs immediate housing stock to catalyse change in private housing, public spaces, shared resources and energy systems. From this perspective, it is clear that RPs are key actors in the pursuit of low-carbon futures even though they are rarely targeted by carbon policies. Their middle position affords influence that goes in multiple directions with multiple effects.

[TABLE 1 NEAR HERE]

6. Discussion and conclusions

Social housing is now the most energy efficient tenure in England, owing to the interventions enacted by RPs, particularly over the last decade. This was in part facilitated by top down ‘green policies’ such as the financial support rolled out via the utility sector’s energy efficiency and carbon obligations, and feed in tariffs. Ultimately, the embedded agency and capacity of RPs enabled them to apply internal and external funding streams towards their specific circumstances and building stocks, to successfully implement low-carbon retrofit in practice. However, despite their success, RPs are not featured as primary actors in the reduction of energy consumption and carbon emissions. There is a continued emphasis on top-down regulations and incentives, and bottom-up behavioural change programmes. As Parag and Janda (2014: 103) note, ‘many middle actors are overlooked because policy makers tend to concentrate either on the big actors (‘top’) such as energy utilities, which have the capacity to make many changes but often lack agency, or the millions of small energy consumers (‘bottom’), which have the agency to decide on many changes but often lack the capacity to exercise them.’

By applying a middle out perspective to low-carbon transitions, this study draws attention to the ways in which RPs were able to harness low-carbon innovations, driven from within their own organisations, to respond to the sizeable challenges in their operating environment in the UK. The organisations represented in the study self-identified as front-runners in low-carbon retrofit. However, their primary motivation for doing so was not to save carbon, but to safeguard the social housing business model and future viability of their housing stock. This sets RPs apart from intermediaries in two ways. Firstly, intermediaries are primarily motivated by low-carbon transitions *per se*, whereas RPs have a purpose that predates and ultimately overrides any low-carbon agenda: the provision of social housing. Secondly, intermediaries do not have the same agency and capacity to directly impact on the socio-technical configurations of the built environment. The ‘unlikely’ rise of RPs as important innovators in the built environment, in policy terms, questions the picking of likely winners which is

typical of successive UK governments in their industrial and innovation policies (White and Wilkinson, 2017). This suggests the need to expand the low-carbon agenda to include middle actors as well as intermediaries. The findings also indicate that the distinction between intermediaries and middle actors is fluid. The social housing sector employs and contracts many important building and energy professionals who perform intermediary roles in a low-carbon sense, but as institutional actors, RPs are able to combine agency and capacity in ways which enable them to have more far-reaching impacts. The middle out perspective illustrates how these organisations became ingenious agents of change, simultaneously confronting significant operational challenges while harnessing the low-carbon agenda for their own aims.

The findings illustrate how RPs used their agency and capacity to advance the low-carbon agenda in different directions – upstream, downstream and sideways. They made direct changes to their building stock, their organisations and business models, as well as influencing their peers in the wider social housing sector and beyond, including privately owned building stock, supply chains and building professionals. The evidence from RPs as middle actors revealed different innovator roles – sectoral, social, process, and civic innovation – that combine their agency and capacity in different ways to affect change. The direction of influence (upstream, downstream and sideways) depended upon which innovation approach is being practiced. Given the transformation of the energy performance of the social housing stock nationally, it is reasonable to assume that many RPs in the UK practise at least one of the low carbon innovator roles identified here in some capacity. Equally, there probably are actors in the sector who have not undertaken low carbon retrofit, such organisations have not been studied as part of this research.

RPs in the UK operate in a volatile policy and regulatory environment both in terms of social housing and support for renewable energy and low-carbon transitions (e.g. Walker *et al.* 2016). Their business models are vulnerable in the present political and economic climate, and the types of external funding that supported the examples of low-carbon retrofit in this study have all but ceased to exist. With this in mind, the middle out perspective is helpful to situate RPs by focusing on their agency and capacity.

The identified policy opportunity is to assist those actors in the social housing sector who have potential to act in this way, and to empower other middle actors in the built environment sector. Given the predictions made about more households going into fuel poverty faster than energy efficiency gains can mitigate against it, social landlords as sustainability advocates and actors bring additional value to the decarbonisation and energy efficiency agendas in the UK. They broaden the perspective on low-carbon activity beyond likely characters.

While the specific focus here was on the agency and capacity of RPs as low carbon innovators, further studies could look at the tensions and constraints that exist in their strategies and potential contradictions that might arise. For example, RPs might be forced to decide to invest in energy efficiency measures rather than in other forms of social need, including balancing between the demand for more units of affordable housing with the specification of the units that exist or are in the pipeline. It would be helpful to understand how these innovation activities come together, how they travel between RPs and beyond the social housing sector, and the long-term effects on the built environment as a whole. Further study could also identify additional middle actors in low-carbon transitions, perhaps equally unlikely or overlooked, as social housing providers.

Declarations of interest: none.

References

Baker, L., Newell, P. and Phillips, J. (2014) The political economy of energy transitions: the case of South Africa. *New Political Economy* 19(6): 791–818.

Bergman, N. and Eyre, N. (2011) What role for microgeneration in a shift to a low carbon domestic energy sector in the UK?. *Energy Efficiency* 4(3): 335–353.

Bird, C. and Barnes, J. (2014) Scaling up community activism: the role of intermediaries in collective approaches to community energy. *People, Place & Policy Online* 8(3): 208–221.

Bulkeley, H. and Castán Broto, V. (2013) Government by experiment? global cities and the governing of climate change. *Transactions of the Institute of British Geographers*, 38(3), 361–375.

Bulkeley, H., Castán Broto, V., Hodson, M. and Marvin, S. (eds) (2011) *Cities and Low Carbon Transitions*. London: Routledge.

Bush, R.E., Bale, C.S.E., Powell, M., Gouldson, A., Taylor, P.G. and Gale, W.F. (2017) The role of intermediaries in low carbon transitions: empowering innovations to unlock district heating in the UK. *Journal of Cleaner Production* 148: 137–147.

Cauvain, J., Karvonen, A. and Petrova, S. (in press) Market-based low carbon retrofit in social housing: insights from Greater Manchester (UK). *Journal of Urban Affairs*.

Darnton, A., Verplanken, B., White, P. and Whitmarsh, L. (2011) *Habits, Routines and Sustainable Lifestyles: A Summary Report to the Department for Environment, Food and Rural Affairs*. London: AD Research and Analysis for DEFRA.

Davies, P. and Osmani, M. (2011) Low carbon housing refurbishment challenges and incentives: architects' perspectives. *Building and Environment* 46(8): 1691–1698.

DBEIS [Department of Business, Energy and Industrial Strategy] (2017) Energy Consumption in the UK. Online [Accessed 30 December 2017]. Available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633503/ECUK_2017.pdf

DCLG [Department for Communities and Local Government] (2017) English Housing Survey 2015 to 2016. Headline Report. Online [Accessed 31 December 2017]. Available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/658478/2015-16_EHS_Headline_Report.pdf

DECC [Department for Energy and Climate Change] (2013) Green Deal Communities. Online [Accessed 30 December 2017]. Available from <https://www.gov.uk/government/news/green-deal-communities>

Edwards, M. (2016) The housing crisis: too difficult or a great opportunity?. *Soundings* 62 (20): 23–42.

Energy Saving Trust. (2011) *Trigger Points: A Convenient Truth*. London: EST.

Fitzpatrick, S., Pawson, H., Bramley, G., Wilcoz, S. and Watts, B. (2017) The Homeless Monitor: England 2017. Online. [Accessed 30 December 2017]. Available from https://crisis.org.uk/media/236823/homelessness_monitor_england_2017.pdf

Geels, F. and Deuten, J.J. (2006) Local and global dynamics in technological development: a socio-cognitive perspective on knowledge flows and lessons from reinforced concrete. *Science and Public Policy* 33(4): 265–275.

Ginsburg, N. (2005) The privatization of council housing. *Critical Social Policy* 25(1): 115–35.

Gliedt, T., Hoicka, C.E. and Jackson, N. (2017) Innovation intermediaries accelerating environmental sustainability transitions. *Journal of Cleaner Production* 174:1247–1261.

Goulden, M. and Spence, A. (2015) Caught in the middle: the role of the facilities manager in organisational energy use. *Energy Policy* 85: 280–287.

Grandclément, C., Karvonen, A. and Guy, S. (2015) Negotiating comfort in low energy housing: the politics of intermediation. *Energy Policy* 84: 213–222.

Guy, S. (2006). Designing urban knowledge: competing perspectives on energy and buildings. *Environment and Planning C: Government and Policy* 24(5): 645–659.

Guy, S., Marvin, S. and Medd, W. (eds.) (2011) *Shaping Urban Infrastructures: Intermediaries and the Governance of Socio-technical Networks*. London: Routledge.

Guy, S. and Shove, E. (2000). *A Sociology of Energy, Buildings and the Environment: Constructing Knowledge, Designing Practice*. London: Routledge.

Hargreaves, T., Hielscher, S., Seyfang, G. and Smith, A. (2013) Grassroots innovations in community energy: the role of intermediaries in niche development. *Global Environmental Change* 23(5): 868–880.

Hastings, A. (2004) Stigma and social housing estates: beyond pathological explanations. *Journal of Housing and the Built Environment* 19(3): 233–254.

Hodkinson, S. and Robbins, G. (2013) The return of class war conservatism? housing under the UK Coalition Government. *Critical Social Policy* 33(1): 57–77.

Hodson, M. and Marvin, S. (eds.) (2015) *Retrofitting Cities: Priorities, Governance and Experimentation*. London: Routledge.

Hoffman, A.J. and Henn, R. (2008). Overcoming the social and psychological barriers to green building. *Organization & Environment* 21(4), 390–419.

Homes and Communities Agency (2018) List of registered providers as at 1 May 2018. Online, available from <https://www.gov.uk/government/publications/current-registered-providers-of-social-housing>

Horne, R. and Dalton, T. (2014) Transition to low carbon?: an analysis of socio-technical change in housing renovation. *Urban Studies* 51(16): 3445–3458.

Janda, K.B. and Parag, Y. (2013) A middle-out approach for improving energy performance in buildings. *Building Research & Information* 41(1): 39–50.

Janda, K.B., Killip, G. and Fawcett, T. (2014) Reducing carbon from the ‘middle-out’: the role of builders in domestic refurbishment. *Buildings* 4(4): 911–936.

Joss, S. (2015) *Sustainable Cities: Governing for Urban Innovation*. London: Palgrave Macmillan.

Karvonen, A. (2013) Towards systemic retrofit: a social practices approach. *Building Research & Information* 41(5): 563–74.

Karvonen, A. (2016) Low-carbon devices and desires in community housing retrofit, in H. Bulkeley, M. Paterson, and J. Stripple (eds) *Towards a Cultural Politics of Climate Change: Devices, Desires and Dissent*, Cambridge: Cambridge University Press, pp. 51–65.

Karvonen, A. (2018) Community housing retrofit in the UK and the civics of energy consumption, in M. Eames, T. Dixon, M. Hunt, and S. Lannon (eds) *Retrofitting Cities for Tomorrow's World*, London: Wiley-Blackwell, pp. 19–32.

Kivimaa, P. and Martiskainen, M. (2018) Innovation, low energy buildings and intermediaries in Europe: systematic case study review. *Energy Efficiency* 11(1): 31–51.

Martiskainen, M. and Kivimaa, P. (2018) Creating innovative zero carbon homes in the United Kingdom: intermediaries and champions in building projects. *Environmental Innovation and Societal Transitions* 26:15–31.

Matschoss, K. and Heiskanen, E. (2017) Making it experimental in several ways: the work of intermediaries in raising the ambition level in local climate initiatives. *Journal of Cleaner Production* 169: 85–93.

Medd, W. and Marvin, S. (2008) Making water work: intermediating between regional strategy and local practice. *Environment and Planning D: Society and Space* 26: 280–299.

MHCLG [Ministry for Housing, Communities and Local Government]. (2018a) Table 100: Number of dwellings by tenure and district <https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants>

MHCLG [Ministry for Housing, Communities and Local Government]. (2018b) Table 101: Dwelling stock by tenure (United Kingdom) historical series. Available from <https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants>

Moss, T. (2009) Intermediaries and the governance of sociotechnical networks in transition. *Environment and Planning A* 41: 1480–1495.

Ofgem. (2017) Overview of previous schemes. Online [accessed 30 December 2017]. Available from <https://www.ofgem.gov.uk/environmental-programmes/eco/overview-previous-schemes>

Opp, S.M., and Saunders, K.L. (2013) Pillar talk: local sustainability initiatives and policies in the United States—finding evidence of the ‘Three E’s’: economic development, environmental protection, and social equity. *Urban Affairs Review* 49(5): 678–717.

Parag, Y. and Janda, K.B. (2014) More than filler: middle actors and socio-technical change in the energy system from the ‘middle-out’. *Energy Research & Social Science* 3: 102–112.

Ravetz, J. (2008) State of the stock: what do we know about existing buildings and their future prospects?. *Energy Policy* 36: 4462–4470.

Smyth, S. (2016) Public accountability: reforms and resistance in social housing. *Public Management Review* 19(2): 212–231.

Sovacool, B.K. (2009) Rejecting renewables: the socio-technical impediments to renewable electricity in the United States. *Energy Policy* 37(11): 4500–4513.

Swan, W. and Brown, P. (eds.) (2013) *Retrofitting the Built Environment*. London: John Wiley & Sons.

Swan, W., Ruddock, L., Smith, L. and Fitton, R. (2013). Adoption of sustainable retrofit in UK social housing. *Structural Survey* 31(3): 181–193.

Trussel Trust (2017) End of Year Stats. Online. [Accessed 30 December 2017] Available from <https://www.trusselltrust.org/news-and-blog/latest-stats/end-year-stats/>

Wade, F., Hitchings, R. and Shipworth, M. (2016) Understanding the missing middlemen of domestic heating: installers as a community of professional practice in the United Kingdom. *Energy Research & Social Science* 19: 39–47.

Walker, G., Karvonen, A. and Guy, S. (2015) Zero carbon homes and zero carbon living: sociomaterial interdependencies in carbon governance. *Transactions of the Institute of British Geographers* 40(4): 494–506.

Walker, G., Karvonen, A. and Guy, S. (2016) Reflections on a policy denouement: the politics of mainstreaming zero-carbon housing. *Transactions of the Institute of British Geographers* 41(1): 104–106.

Watson, K.J. (2015) Understanding the role of building management in the low-energy performance of passive sustainable design: practices of natural ventilation in a UK office building. *Indoor and Built Environment* 24(7): 999–1009.

White, C. and Wilkinson, B. (2017) Creating, not picking winners: how to develop an industrial strategy which works for everyone. The Policy Institute and Kings College London. Online, available at: <https://www.kcl.ac.uk/sspp/policy-institute/publications/Creating-not-picking-winners.pdf>.