Low-Carbon Devices and Desires in Community Housing Retrofit
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Introduction

In recent years, a wide variety of actors including the UK government, local authorities, social housing providers, civil society groups, and private homebuilders have initiated domestic retrofit programmes based on the notion of 'community'. The embrace of community is an attempt to create a shared network of inquiry as well as action in an arena that is largely fragmented and driven by the individual preferences of homeowners. Advocates of community retrofit argue that lowering the carbon emissions of domestic buildings requires closer connections between building owners, occupants, designers, builders, financiers, local authorities, and civil society groups. These programmes have the potential to make significant changes to the overall housing stock but have particular implications on the devices and desires of low-carbon culture as well as the broader politics of climate change.

The aim of this chapter is to explore the cultural and political implications of reframing domestic retrofit as a 'more-than-individual' undertaking and how the community approach reconfigures the cultural politics of climate change. It examines how devices and desires are introduced and configured to realize energy savings, improved comfort conditions, and modernization across multiple houses simultaneously. It builds upon a small but growing body of literature on the role of 'community' in domestic retrofit activities (Brown and Vergragt 2012, Vergragt and Brown 2012, Gee and Chiappetta 2013, Karvonen 2013, Swan 2013, Gupta et al 2014) and connects with work being done on civil society approaches to sustainable transitions (Seyfang and Smith 2007, Seyfang et al 2010, Seyfang and Haxeltine 2012). The focus on the housing stock, rather than the individual house, introduces a meso-scale of domestic carbon emissions and provides a new arena of low-carbon culture with particular implications on politics.

The chapter begins with a summary of the challenges to systemic domestic retrofit in the UK and the deficiencies of the 'rational choice' model commonly employed by Government and other organizations to target individuals. Walker's (2011) typology of community is then used to analyse four emerging approaches to collective domestic retrofit. These programmes embody a range of interpretations of community with different implications for the formation of low-carbon devices and desires around domestic retrofit. The chapter concludes by reflecting on the emerging politics of climate change that are embedded in community retrofit approaches. While these programmes have the potential to open up domestic energy consumption to more nuanced and relational understandings of habitation, they can also be interpreted as a post-political response to the government's responsibilities towards carbon mitigation.

Challenges to Systemic Housing Retrofit

The notion of 'systemic urban retrofit' has emerged in recent years as a comprehensive approach to realising low-carbon transitions in cities (Hodson and Marvin 2010a, 2010b, Dixon and Eames 2013,

Eames et al 2013, May et al 2013, Dixon et al 2014). There is a shared assumption that the threats posed by climate change and peak oil as well as the challenges of out-dated infrastructure, rising energy prices, and the emergence of a global consumer culture requires an extended, purposeful, and comprehensive reordering of the built environment. As May and colleagues (2013: 7) argue, 'Cities are increasingly sites where a set of critical pressures around decarbonization, economic activity, and the organization of networked infrastructures and the built environment coalesce and where the potential for innovative responses to these pressures exists.' Systemic urban retrofit is thus an ambitious agenda to ensure that the built environment is fit for purpose in the twenty-first century and beyond.

Advocates of systemic urban retrofit recognize that the existing built environment cannot simply be wiped away and replaced with infrastructure networks that are more suitable to twenty-first century populations. Cities are inextricably bound up in social, cultural, and political systems that resist fundamental change (see Hommels 2005, Ravetz 2008, Guy and Karvonen 2011). As such, the existing built environment will need to be reworked, renewed, redeveloped, and revived through iterative and coordinated processes of sociotechnical change. And arguably, these processes of change will require novel modes of governance that can harmonize and broker the various agendas that shape cities. Eames and colleagues (2013: 506) conclude that 'large-scale urban retrofitting requires systemic change in the organization of built environment and infrastructure, and the integration of socio-technical knowledge, capacity and responses.' Thus, systemic urban retrofit is as much a challenge to governance as it is to economics, function, and design.

The housing stock accounts for about one-quarter of the UK's carbon emissions largely due to energy demands for domestic heating and hot water supply. New houses are designed and constructed with significantly lower carbon footprints when compared to existing houses but the rate of replacement is quite low (less than 0.5% per year). It is estimated that two-thirds to three-quarters of today's housing stock in the UK will still exist in 2050 (SDC 2006, Roberts 2008). Meanwhile, the governance of the existing housing stock is influenced by a diverse range of regulations, incentives, stakeholders, and information sources. Unlike the new build industry, there is no clear set of guidelines and regulations to steer retrofitting activities in the domestic sector. Thus, systemic *housing* retrofit shares a similar emphasis with systemic *urban* retrofit in the need for innovative forms of governance.

The term 'retrofit' is used here to denote upgrades to existing houses to meet contemporary norms and standards or to prepare for future conditions. The term is synonymous with renovation, modernization, restoration, and rehabilitation, and describes those activities undertaken by homeowners that go beyond routine maintenance and repair activities (see Meijer et al 2009, Dixon and Eames 2013). Challenges to systemic retrofit include a wide range of housing ages and construction methods, a low rate of property turnover, disruption and inconvenience to occupants, undesirable payback periods for many energy-efficiency strategies, a lack of occupant interest in energy efficiency, and a dearth of knowledgeable and competent professionals to advise homeowners and to implement energy-efficiency strategies (see Clarke 2006, SDC 2006, Roberts 2008, Ravetz 2008, Oreszczyn & Lowe 2010, Karvonen 2013, and Swan 2013). Furthermore, upgrading the energy efficiency of the existing housing stock involves thousands of product manufacturers, installers, local councils, and charity organizations as well as building owners and occupants. In short, the balkanized character of the housing retrofit industry presents a significant challenge to realising widespread change. As Oreszczyn and Lowe (2010: 110) note, 'Empirical evidence and experience suggest that it will be neither particularly easy nor particularly cheap to reduce energy use in buildings. However, there is a perception in government that energy efficiency in buildings is straightforward and requires minimal investment.' This creates a significant challenge for reducing the carbon emissions of the housing stock.

The Rational Choice Approach to Domestic Retrofit

The UK Government has developed and applied a wide range of regulations, incentives, and programmes to improve energy performance and reduce the carbon footprint of the existing housing stock, ranging from minimum housing requirements (e.g., Building Standards, Decent Homes Standard, Scottish Housing Quality Standard) to grants and incentive programmes (Green Deal, Renewable Heat Incentive). The aim is to compel or encourage homeowners to retrofit their properties via legal or financial means. Ideally, these policies and programmes will simultaneously improve quality of life, health, and property value through the modernization of houses to meet contemporary standards of build quality and performance.

To date, government regulations and incentive programmes have resulted in piecemeal upgrades and incremental improvements to the housing stock but have not realized widespread change due to the challenges noted above (see Eames et al 2013). In addition, these approaches embody particular assumptions about the most effective drivers of retrofit, specifically market mechanisms and economic rationalist understandings of human agency. Maller and colleagues (2012: 257) argue that these approaches 'are unlikely to achieve widespread systemic changes needed to address the environmental and social challenges of climate change, largely because they do not challenge the status quo and overlook the routines of everyday life.' In effect, regulations and incentives fail to connect with the lived experience of domestic carbon activities and do not resonate with the longer-term development of low-carbon cultures.

In addition to regulations and incentives, another common approach to systemic housing retrofit involves information provision. There is an underlying assumption that energy efficiency upgrades are stymied by a lack of knowledgeable homeowners and building professionals. The Centre for Refurbishment Excellence (2015) in Stoke-on-Trent is an example of an information hub and training centre that serves as a gateway to products, techniques, best practices, and case studies on domestic retrofit for the construction industry. And the SuperHomes Network (2015) comprising more than 100 exemplary houses provides real world examples on how to reduce domestic carbon emissions through energy efficiency upgrades. Like regulations and incentives, a significant drawback to information provision is that it only has limited potential to influence homeowners. Moloney and colleagues (2010: 7616) argue that, 'Information can be an important first step in prompting people to change their behaviour. However, information alone is unlikely to motivate changes as a matter of course'. In other words, information provision is necessary but insufficient to realising widespread changes in the housing stock; there is no guarantee that knowledge provision will lead to action on the ground.

With respect to the cultural politics of climate change, information provision, regulations, and incentives focus on the individual as the agent of change. There is an implicit embrace of the 'rational choice' model that assumes that individuals have the capacity and motivation to consider a palette of options presented before them and to then make logical decisions based on economics, environment, health, and so on (see Hobson 2002, Gram-Hanssen 2009, 2010, Heiskanen et al 2010, Shove 2010, Spaargaren 2011, McMeekin and Southerton 2012, and Berry et al 2014). Houses are a logical target for carbon mitigation strategies because they are recognized as sites of consumption of energy, water, food and other resources. They also serve as a convenient locus to link the activities of everyday life to the broader goals of carbon reduction (Abbott and Wilson 2014) and are more familiar and comprehensible to a wider range of society than other geographic scales (Lane and Gorman-Murray 2011). However, houses present a challenge to the development of a shared low-carbon culture because they are understood as individual spaces and are influenced by the dominant regime of private property ownership.

Arguably, the focus on the house as the locus of carbon mitigation has resulted in an overemphasis on the role of individuals (particularly homeowners) in the pursuit of a more energy efficient houses while overlooking the physical and social structures that shape the evolution of the housing stock. The *house* perspective does not acknowledge that the *housing stock* is 'a cultural asset that is embedded in the fabric of everyday lifestyles, communities, and livelihoods' (Ravetz 2008: 4463). Moreover, it takes 'attention away from the necessity of collective political responses' (Paterson and Stripple 2010: 344) that are needed to realize systemic retrofit. There is a misalignment of the private sphere where domestic carbon emissions originate and the public sphere where carbon reduction targets are promulgated. This suggests that retrofit programmes need to go beyond the focus on the individual house and the rational choice model by developing different approaches to innovation and change. The emergence of community housing retrofit programmes is one way that this is occurring.

Community as a Meso-Scale of Low-Carbon Politics

The notion of 'community' is a key topic of debate in a variety of disciplines ranging from sociology and geography to political science and anthropology. In contemporary discourses on environmental politics and sustainable development, community is at the heart of notions of grassroots innovation (e.g. Seyfang and Smith 2007, Seyfang et al. 2010, Seyfang and Haxeltine 2012), civic environmentalism (e.g., Agyeman and Angus 2003, Agyeman 2005, Karvonen 2011, Karvonen and Yocom 2011, Agyeman 2013), environmental governance (Bäckstrand 2003, Bulkeley 2005, Newig and Fritsch 2009, Walker 2011), social movements (Hess 2007, Shutkin 2000), and political theory (Putnam 2000, Little 2002, Barber 2003, DeFillipis et al 2006). The notion of community targets a scale of environmental activity that is larger than the individual but smaller than the state. Community serves as a way to organize and discipline low-carbon activities at a level beyond the individual or household but where actual change can still occur.

However, community is not simply a more conveniently-sized container for environmental activity. With respect to issues of energy consumption and carbon emissions, communities frequently form to engage in protest activities (Kitschelt 1986, Walker 1995, Van der Horst 2007, Cass and Walker 2009, Wolsink 2010). More recently, communities have also formed to participate in locally-owned energy generation schemes (Muruyama et al 2007, Rogers et al 2008, Walker et al 2007, Walker 2008, Walker and Devine-Wright 2008, Walker et al 2010). As a whole, Walker (2011: 777) notes that:

> The involvement of communities has become an increasingly recurrent feature of carbon-related discourse, viewed as positive, productive and contributing to the successful implementation and social embedding of various forms of carbon reduction activity—including the use of renewable energy technologies, the adoption of energy efficiency and conservation measures, shifts in consumption practices and in patterns of mobility.

Likewise, Aiken (2014: 2) argues that community 'emerges as a key site in the transition to low carbon futures partly because of its ability to encompass both the global and local, and also to internalize and governmentalize the behavioural changes that transition to low carbon futures requires.' Community is a strategy of carbon governance that makes a novel link between the individual consumer and the government charged with regulating that consumption. It produces a new political sphere of interest around low-carbon lifestyles that are shared rather than individual. Thus, community creates a venue where low-carbon cultures have the potential to take root and flourish.

In recent years, an increasing number of local, regional, and national organizations in the UK have developed and trialled community-based programmes of domestic retrofit (see Karvonen 2013, Swan 2013). These novel programmes serve as alternatives to regulations, incentives, and information

provision by acknowledging the embeddedness of houses in their cultural and socio-material contexts and involves a rescaling of retrofit from the individual household to include the wider range of stakeholders.

Community-led housing retrofit programmes vary widely but they have a few commonalities. First and foremost, occupants are placed at the centre of decision-making processes. There is an explicit understanding that retrofit is an intervention into domestic practices and to be effective, the occupant needs to be involved in the reconfiguration of these practices to achieve buy in and acceptance. Second there is a recognition that individuals houses are part of a larger housing stock with shared commonalities. Thus, there is an emphasis not on the individuality of a house but on its shared characteristics with other houses. This might entail the age or building techniques, materials, or systems that make the house function. And third, there is an emphasis on knowledge sharing and recursive learning to manage the complexities involved in retrofit activities. Techno-economic issues related to carbon reduction and energy savings are supplemented with social and cultural issues around comfort, health, well-being, and happiness. Retrofit is understood as a process of harmonizing sociotechnical configurations into new alignments and this requires the sharing of knowledge amongst retrofit stakeholders (Vergragt and Brown 2012).

Beyond these commonalities, community retrofit programmes vary widely, taking on different characteristics depending on which actors instigate the programmes and how they interpret the notion of community. Community can consist of civil society groups, neighbouring residents, design and construction professionals, government officials and agencies, or a combination of these groups. And these collectives utilize different devices or instruments of governance to realize retrofit of the housing stock. Walker (2011) provides a typology of six meanings of 'community' commonly used in carbon governance that is useful for unpacking the devices and desires of systemic retrofit. He (2011: 778) notes, 'The different meanings of community that are drawn on by policy and nongovernmental actors link to a set of expectations about what community can productively bring to carbon mitigation initiatives.' He goes on to argue that 'community' can refer to an actor, scale, place, network, process, or identity, producing different low-carbon cultures (see **Table 1**).

Table 1 Walker's typology of 'community' as it relates to domestic retrofit

Community as:	
Actor	An entity with agency (such as 'the public') that can realize collective change. It suggests the need to refocus retrofit attention from the individual homeowner to the broader chain of actors that influence the housing stock (financiers, designers, builders, regulators, etc.).
Scale	A meso level between the individual householder and overarching government policies. Domestic retrofit is focused on a group of houses (the housing stock) and this agglomeration makes retrofit practices visible and credible while increasing the magnitude of change to the built environment.
Place	A particular geographic locale for organising individuals and their concomitant lifestyles. It involves the setting of boundaries around a street, neighbourhood, district, or town to encompass a common socio-material locale.
Network	A forum for sharing information and fostering learning through face-to-face interaction (meetings, consultations, home visits) as well as virtual portals (websites, directories, chatrooms). The network involves interaction and exchange through activities of co-learning and co-production of ideas, experiences, and knowledge.
Process	A shared activity amongst multiple actors. There is an emphasis on the 'doings' of a group of people and the building of social capital through the sharing of these

	experiences. Retrofit is an activity of change or the journey of transition to a low-carbon future.
Identity	A mode of collective thinking that informs a 'civic' sensibility. Retrofit becomes part and parcel of the collective persona beyond the individual and the family, similar to other domestic practices such as recycling, gardening, and using mass transit. The house is an extension of the householders' values.

In the following sections, four community retrofit programmes are compared and contrasted to understand how the notion of community is interpreted and how this informs the cultural politics of climate change. The aim here is not to assess the effectiveness of these programmes to reduce carbon emissions but rather to understand how the collective sensibility is achieved; how knowledge is created, produced, and circulated; and how these programmes reorder the sociotechnical configurations of the housing stock. The programmes reveal that low-carbon cultures can be produced through different arrangements of devices and desires.

Community as an Extension of Existing Government Programmes

The UK government began targeting communities for low-carbon innovation in 2005 with the release of the report *Securing the Future* (HM Government 2005). Subsequent reports have reinforced and extended the emphasis on community and are based on the assumption that 'community level initiatives hold the potential to ground climate change policy in a much more visible way to the everyday practicalities of energy use than more "top-down" measures have been able to achieve' (Peters et al 2010: 7596). Hauxwell-Baldwin (2013: 9) argues that 'community is conflated with civil society as part of a new social architecture through which the "search for sustainability" may be governed, and new social movements form around "the complex area of climate change and energy efficiency"'. As such, community emerges as a novel approach for the UK Government to address the challenges of climate change by rescaling the targeted receivers of government policies and programmes.

In January 2013, the UK Government launched the Green Deal programme, its flagship initiative to upgrade the nation's housing stock. The Green Deal is essentially a finance mechanism that allows homeowners to pay for retrofit investments over time through their energy bills. The programme follows a conventional rational choice model to influence change in the existing housing stock by targeting individual homeowners and appealing to their pocketbooks. To date, there has been very low participation in the Green Deal programme for a variety of reasons (unattractive financing options, a lack of trust in installers, poor execution of the programme, etc.) (see House of Commons 2014, UK Government 2015, Vaughan & Collinson 2015). Subsequently, in March 2014, the UK government announced that six local authorities have been awarded funding under the Green Deal Communities Initiative (DECC 2015). This initiative builds upon the existing Green Deal programme by enrolling Local Authorities and their community partners to deliver the Green Deal programme to more than 7000 properties by leveraging the networks and existing programmes of energy efficiency at the local level. It assumes that the individual focus of the original Green Deal programme is valid but it needs to be implemented at the local scale where the goals of the programme can be more closely aligned with the lived realities of homeowners.

With respect to Walker's typology of community, the Green Deal Communities Initiative interprets community as an actor or agent of change to make an existing Government incentive programme more effective. The local authorities and their community partners work as intermediary organizations to link up the carbon reduction national targets of the UK government with the individual decision-making of homeowners to realize systemic change to the housing stock. This

approach to community retrofit does not create a new community nor does it move beyond the individual as the agent of change. Instead, it recognizes that local authorities are better equipped to align the collective desires of their constituency with the low-carbon device, in this case financial incentives of the UK government. There is continued reliance on the rational choice model of human agency but an acknowledgement that these mechanisms are most effectively managed and carried out at the local scale where local authorities have a more nuanced understanding of the housing stock. There is an implicit assumption that the local is the proper scale where the most effective decision-making can take place and where the most effective use of public money can be found (Shutkin 2000, Aiken 2014). Likewise, the desires are identical to the original Green Deal programme and emphasis economic savings to homeowners while lowering their domestic carbon emissions.

Community as Identity Politics
A markedly different approach to community housing retrofit involves locally-based initiatives of community housing retrofit that are rooted in a particular place. Tapping into a lineage that extends back to the Appropriate Technology movement and intentional communities of the 1970s, programmes such as Transition Towns and Transition Streets use a shared geography to develop and roll out customized low-carbon projects aimed at food growing, local energy production, self-sufficient economic exchange, and so on (Hopkins 2008, Smith 2011a, 2011b, Aiken 2012, 2014, Feola and Nunes 2014). Housing retrofit programmes here are part of the larger agenda of low-carbon lifestyles that tap into the identity notion of community.

An example of this approach is the Community Action for Retrofit Delivery (CARD) project, one of several programmes initiated through Transition Town Totnes (TTT 2015). CARD was initiated in 2013 and involves five organizations in South West Devon who deliver workshops and home energy assessments with the goal of upgrading 250 houses. Retrofit activities are targeted to a particular geography and to homeowners who have embraced the Transition Town agenda. A second domestic retrofit programme of Transition Town Totnes is called Transition Homes and uses a more informal approach of knowledge sharing. Here, friends and neighbours meet every few weeks to discuss how they can reduce their carbon footprints by changing their consumption of energy, food, water, transport and packaging. Retrofit becomes normalized as a frequent topic of conversation amongst neighbours who are striving to lead low-carbon lives.

In both projects, community is engendered through an emphasis on place and identity. The device of a local knowledge network is introduced to enhance and enable the existing low-carbon culture. By situating retrofit in a particular locale within an established low-carbon culture, networks of retrofit knowledge can be developed and applied to a familiar housing stock. This approach suggest a very different mode of community that is founded on 'social innovation' to challenge and disrupt existing institutional frameworks (Aiken 2014). The UK government are no longer the arbiters of a low-carbon future; they are replaced by an active and self-organized citizenry. This creates an insular form of identity politics around particular norms where social innovation can be enacted. The programme is targeted at those who have subscribed to the shared ethos of the community; low-carbon housing becomes one of several agendas of the existing low-carbon culture of Transition Town Totnes.

Community as Coordinated Knowledge Network
Between the rescaled actor approach of the UK government and the place-based identity politics of Transitions Towns lie a multitude of community-based retrofit programmes that take more nuanced approaches to community retrofit. A growing array of knowledge networks address the challenge of retrofit by joining up various actors that are involved in domestic retrofit activities, from financial experts to energy modellers, builders, product manufacturers, and homeowners. These programmes go beyond information provision to embrace a socio-technical perspective that recognizes retrofit as a

complex process of aligning different actors who can influence the housing stock (Vergragt and Brown 2007, 2012). Systemic retrofit can be achieved by creating more effective circuits of knowledge and momentum for action via coordination and facilitation. A new community is formed through the simultaneous development of a network of knowledge sharing and an embrace of the process of retrofitting.

An example of the community knowledge network approach is Refit West, a programme that targeted 11 owner-occupied houses in the Bristol City Region for whole house retrofit (Ross 2011). The programme was instigated by a non-profit organization, Forum for the Future, that recognized the need to create closer links between homeowners and retrofit experts. The homeowners volunteered to participate and were motivated by a shared desire to reduce their energy bills and carbon footprints while improving comfort conditions and modernising their houses. They are not bound together by a political or cultural ethos but by the perceived need to retrofit their houses. Forum for the Future served as an intermediary in the retrofit process to manage challenges related to financing, contracting, and delivery.

In many ways, this is a pragmatic approach that focuses specifically on community as a means to facilitate the 'process' of housing retrofit with an emphasis on the 'doings' of domestic habitation and how homeowners use energy in their houses. Like the previous example, it relies on 'societal learning' (Vergragt and Brown 2007) as a means to realize a low-carbon future but there is a stronger emphasis on strengthening the connections between the providers and receivers of retrofit activity. These networks engender recursive learning and customized solutions to facilitate the co-evolution of the built environment and society (Evans and Karvonen 2011, 2014, Hertin et al 2003, Vergragt and Brown 2007, 2012, Moore and Karvonen 2008, Oreszczyn and Lowe 2010, Ross 2011, Stafford et al 2011, Gupta et al 2014). Retrofit activities are the singular focus of Refit West as opposed to the multiple topics addressed through Transition Town Totnes.

Community here is used to harmonize the process of domestic retrofit. This involves the introduction of a new actor to intermediate the various steps of retrofit and serve as broker between the various stakeholders. These individuals or organizations 'work in-between, make connections, and enable a relationship between different persons or things' (Moss et al 2010: 5). In this case, the intermediary is a non-profit organization but it could just as easily be a local authority, a community group or even a private contractor. The knowledge network serves as a device to align the various desires of homeowners with the doings of retrofit. This suggests a politics of intermediation as key to realising a low-carbon future (Brand and Karvonen 2007, Karvonen and Brand 2009, 2013). However, the ultimate decisions about retrofit remain with the homeowner. Like the previous three examples, there is no challenge to the existing mode of private property ownership or the notion that the house is a private space shaped by individual decisions.

Community as a Manifestation of Moral Responsibility

Another more nuanced example of a community retrofit programme involves social housing providers with the aim of tackling fuel poverty and promoting better health and well-being while also saving energy (Gee and Chiappetta 2013, Swan 2013). Here there is an expansion of low-carbon desires to encompass public health and social equity. The focus on low-income residents makes an explicit connection between social policy and environmental policy. May and colleagues (2013: 11) note:

> Conventional retrofit has often had a strong social policy dimension, such as improving the energy performance of low-income households and, in developing countries, upgrading infrastructure in squatter community sites and settlements. The most common logic has been

retrofitting as part of social policy 'done' to low-income and poor households, who are often seen as compliant and unable to resist.

To counter this logic of 'doing' retrofit to low-income households, a number of social housing providers have developed more collaborative models to upgrade their housing stocks. These programmes benefit social housing providers by building up trust and better relations with their tenants while also creating a shared identity amongst occupants. Community is thus about creating a particular actor as a process that counters the prescriptive approach to housing retrofit that is common in social housing.

An example of such a programme is the New Barracks Estate in Salford (Arup and Salix Homes 2011, 2012a, 2012b, Arup 2012). In 2010, Salix Homes retrofitted 79 Edwardian terraced houses on the New Barracks Estate to reduce energy consumption, combat fuel poverty, and improve the comfort and health of occupants. Rather than conceive the occupants as simply receivers of housing upgrades, the team recognized that it would be beneficial to include them in the process to reduce conflicts and to achieve long-term buy-in of the installed measures. As one of the consultants (Arup 2012) notes, 'Rather than focusing solely on physical improvement, Salix has looked at how this will help improve energy consumption and the environmental impact of its properties, as well as the experience of tenants living in its homes.' The project involved the coordination of tenants, the management body, local and national authorities, equipment suppliers and installers, and utility companies.

The notion of 'community' is employed here to expand the group of retrofit stakeholders to include low-income renters, a group that is frequently left out of retrofit decision-making processes. The device of low-carbon politics is an arena of deliberation and empowerment. While the device is similar to the previous example of Refit West, the desires are markedly different. The inclusion of vulnerable populations in social housing suggests that retrofit is not simply about reducing carbon emissions and energy bills but is a means to provide a social good, namely housing that is healthy, comfortable, and affordable (Gee and Chiappetta 2013). And unlike the previous example where a new intermediary was introduced to facilitate retrofit, community here is built around an existing intermediary – the social housing provider. This reinforces the role of social housing providers in shaping the everyday lives of their tenants to introduce low-carbon desires to the occupants. The low-carbon desire then becomes one of several other desires of social housing stakeholders including affordability, comfort, safety, health, and prosperity.

The Low-Carbon Politics of Community Housing Retrofit
The emergence of 'community' in domestic retrofit programmes serves as an intriguing development in the upgrading of the built environment in the UK. The programmes described above attempt to go beyond conventional approaches of regulations, financial incentives, and information provision to address the entrenched structures that prevent decarbonization of housing. Community is used to organise and discipline low-carbon interventions in new ways. It introduces a meso-scale between the individual homeowner or occupant and distant low-carbon targets of the national government by tapping into the sociotechnical arrangements of occupants and systems of provision (Guy 2006, Rohracher 2008). As Walker (2011: 779) notes, 'Community is seen as an integral part of wider innovation, learning, education, and diffusion processes, acting as a conduit, a lubricant and an exemplar for change.' There is recognition of the lived aspects of housing and the need to simultaneously address the social and material aspects of retrofit activities through new modes of governance.

It is important to recognize that community is leveraged via different devices and desires in each programme. The UK government uses community as a means to enhance an existing financial device,

their Green Deal Programme while the dual desires of low carbon and cost savings remain unchanged. Transition Town Totnes leverages the shared desires of local residents around low-carbon lifestyles and political autonomy to create a network of shared learning. Refit West introduces a similar device consisting of a coordinated knowledge network with a specific focus on harmonising the retrofit process. Unlike Transition Town Totnes, the autonomy of the household is not questioned and the desires are unique to each household. Salix Homes takes a similar emphasis on intermediating the retrofit process but uses it to add low carbon to existing desires for health, safety and comfort. This diversity of approaches reflects the flexibility of community as a strategy for environmental governance and its ability to assemble stakeholders in multiple ways.

Equally important to the devices and desires of community retrofit are the politics that these approaches embody. From one perspective, the rise of collective action can be interpreted as a positive, constructive agenda to address the complexities of climate change and to disrupt the lock-in of high carbon lifestyles in developed countries. Community is enacted to bridge the state and the individual and to create a space for collective action and identity (Peters et al 2010). At their best, community approaches to housing retrofit can provide a 'politics of hope' (Coutard and Guy 2007) that embodies an emancipatory and constructive politics to revise low-carbon futures. By recasting governance from a top-down/bottom-up dichotomy to tap into the 'specific rhythms and capacities of communities, households and individuals' (Coutard and Rutherford 2010: 724), community provides an avenue for aligning long-term carbon mitigation aims with everyday domestic activities.

Alternatively, the rise of community could be portrayed pessimistically as a symptom of post-politics (Swyngedouw 2007, 2009) and the erosion of the state as the principal arbiter of ecological governance (Karvonen 2010). Here, community can be seen as a way to enforce consensus and agreement rather than address the inherently contested character of low-carbon transitions. Indeed, none of these community approaches advertise any intractable conflicts or frictions in the pursuit of a low-carbon, economically prosperous, and socially equitable society. Thus, community can be seen as a symptom of the post-political world where dissent is suppressed or ignored. The emphasis on harmonization and commonalities is hopelessly naïve when compared to more radical agendas that champion dissent and disagreement as the fuel of low-carbon politics. Moreover, the rise of community approaches to carbon mitigation could serve as a means for government to offload its responsibility for carbon mitigation while leaving civil society groups with the responsibility but not the power to enact systemic change (DeFillipis et al 2006). The emergence of low-carbon community programmes placates more radical political agendas with the promise of local empowerment while reinforcing the dominant neoliberal global economy (Karvonen et al 2014).

Whether the community housing retrofit programmes described above (as well as the larger push towards low-carbon futures) signals the emergence of more progressive politics of climate governance or is simply another example of twenty-first century post-politics remains to be seen. All of these retrofit programmes are relatively new and unproven. There are many reports of early successes and challenges but it is unclear if these endeavours can be sustained in the long term and if they will catalyse a new politics of climate governance. Thus, community housing retrofit approaches raise a number of intriguing questions about the low-carbon politics. Can community housing retrofit programmes feed into a broader culture shift where low-carbon lifestyles become the norm or will they be a short-lived trend of environmental politics (similar to the alternative energy social movements that emerged after the 1973 oil crisis and then faded in the 1980s)? Is there a possibility to integrate these activities with other domestic practices such as transport and food to create the more holistic transition (as advocated by Transition Town actors) or will carbon continue to be addressed sector by sector with little recognition of the interconnected nature of greenhouse gas emissions? And is it possible to realize a low-carbon future for all in society or does the formation of communities

inevitably favour some while excluding others, perpetuating and exacerbating the existing uneven landscape of climate change? All of these issues highlight the embeddedness of high carbon lifestyles and the politics involved in developing new low-carbon cultures.

References

Abbott, Dina and Wilson, Gordon. 2014. 'Climate change: lived experience, policy and public action', *International Journal of Climate Change Strategies and Management* 6(1): 5-18.

Agyeman, Julian. 2005. *Sustainable Communities and the Challenge of Environmental Justice.* New York: New York University Press.

Agyeman, Julian. 2013. *Introducing Just Sustainabilities: Policy, Planning and Practice.* London: Zed Books.

Agyeman, Julian and Angus, Briony. 2003. 'The role of Civic Environmentalism in the pursuit of sustainable communities', *Journal of Environmental Planning and Management* 46: 345-363.

Aiken, Gerald. 2012. 'Community transitions to low carbon futures in the Transition Towns Network (TTN)', *Geography Compass* 6(2): 89-99.

Aiken, Gerald Taylor. 2014. '(Local-) community for global challenges: carbon conversations, transition towns and governmental elisions', *Local Environment* 1-18.

Arup. 2012. Retrofitting programme reduces bills (press release, 25 January 2012), <http://www.arup.com/News/2012_01_January/25_Jan_2012_Retrofitting_programme_reduces_gas_bills.aspx>, downloaded 20 July 2013.

Arup and Salix Homes. 2011. *New Barracks Estate Retrofit: Social Return on Investment.* January 2011.

Arup and Salix Homes. 2012a. *New Barracks Estate Retrofit: Measuring Change Post Retrofit.* January 2012.

Arup and Salix Homes. 2012b. *New Barracks Estate Retrofit: Post Retrofit Evaluative Social Return on Investment.* January 2012.

Bäckstrand, Karin. 2003. 'Civic science for sustainability: reframing the role of experts, policy-makers and citizens in environmental governance', *Global Environmental Politics* 3(4): 24-41.

Barber, Benjamin R. 2003. *Strong Democracy: Participatory Politics for a New Age.* Berkeley, University of California Press.

Berry, Stephen, Sharp, Anne, Hamilton, Jo and Killip, Gavin. 2014. 'Inspiring low-energy retrofits: the influence of 'open home' events', *Building Research & Information* 42(4): 422-433.

Brand, Ralf and Karvonen, Andrew. 2007. 'The ecosystem of expertise: complementary knowledges for sustainable development', *Sustainability: Science, Policy and Practice* 3(1): 21-31.

Brown, Halina Szejnwald and Vergragt, Philip T. 2012. 'Grassroots innovations and socio-technical system change', in G. Marletto (Ed.) *Creating a Sustainable Economy: An Institutional and Evolutionary Approach to Environmental Policy*, London: Routledge.

Bulkeley, Harriet. 2005. 'Reconfiguring environmental governance: towards a politics of scales and networks', *Political Geography* 24(8): 875-902.

Cass, Noel and Walker, Gordon. 2009. 'Emotion and rationality: the characterisation and evaluation of opposition to renewable energy projects', *Emotion, Space and Society* 2(1): 62-69.

Centre for Refurbishment Excellence. 2015. Centre for Refurbishment Excellence website, www.core-skills.com, last accessed 22 February 2015.

Clarke, Linda. 2006. 'Valuing labour', *Building Research & Information* 34(3): 246-256.

Coutard, Olivier and Guy, Simon. 2007. STS and the city: politics and practices of hope', *Science, Technology and Human Values* 32(6): 713-734.

Coutard, Olivier and Rutherford, Jonathan. 2010. 'Energy transition and city-region planning: understanding the spatial politics of systemic change', *Technology Analysis & Strategic Management* 22: 711-727.

DECC 2015. Green Deal Communities Initiative website, https://www.gov.uk/government/news/green-deal-communities, last accessed 22 February 2015.

DeFilippis, James, Fisher, Robert, and Shragge, Eric. 2006. 'Neither romance Nor regulation: re-evaluating community', *International Journal of Urban and Regional Research* 30(3): 673-689.

Dixon, Tim and Eames, Malcolm. 2013. 'Scaling up: the challenges of urban retrofit', *Building Research & Information* 41(5): 499-503.

Dixon, Tim, Eames, Malcolm, Hunt, Miriam and Lannon, Simon. 2014. *Urban Retrofitting for Sustainability: Mapping the Transition to 2050,* Abington: Routledge.

Eames, Malcolm, Dixon, Tim, May, Tim and Hunt, Miriam. 2013. City futures: exploring urban retrofit and sustainable transitions, *Building Research & Information* 41(5): 504-516.

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

Evans, James and Karvonen, Andrew. 2011. Living laboratories for sustainability: exploring the politics and epistemology of urban transition, in H. Bulkeley, V. Castán Broto, M. Hodson, and S. Marvin (Eds) *Cities and Low Carbon Transitions,* London: Routledge, pp. 126-141.

Evans, James and Karvonen, Andrew. 2014. '"Give me a laboratory and I will lower your carbon footprint!" – urban Laboratories and the pursuit of low carbon futures', *International Journal of Urban and Regional Research* 38(2): 413-430.

Feola, Giuseppe and Nunes, Richard. 2014. 'Success and failure of grassroots innovations for addressing climate change: the case of the Transition Movement', *Global Environmental Change* 24: 232-250.

Gee, Patricia and Chiappetta, Lucrezia. 2013. 'Engaging residents in multifamily building retrofits: reducing energy consumption and enhancing resident satisfaction', in W. Swan and P. Brown (eds.) pp 157-169.

Gram-Hanssen, Kirsten. 2009. 'Standby consumption in households analyzed with a practice theory approach', *Journal of Industrial Ecology* 14(1): 150-165.

Gram-Hanssen, Kirsten. 2010. 'Residential heat comfort practices: understanding users', *Building Research & Information* 38(2): 175-186.

Gupta, Rajat, Barnfield, Laura, and Hipwood, Tara. 2014. 'Impacts of community-led energy retrofitting of owner-occupied dwellings', *Building Research & Information* 42(4): 446-461.

Guy, Simon. 2006. 'Designing urban knowledge: competing perspectives on energy and buildings', *Environment and Planning C* 24**:** 645-659.

Guy, Simon and Karvonen, Andrew. 2011. Using sociotechnical methods: researching human-technological dynamics in the city, In J. Mason and A. Dale (Eds) *Understanding Social Research: Thinking Creatively about Method,* London: Sage Publications, pp. 120-133.

Hauxwell-Baldwin, Richard. 2013. *The Politics and Practice of 'Community' in UK Government-Funded Climate Change Initiatives: The Low Carbon Communities Challenge.* 3S Working Paper 2013-19, Norwich: Science Society and Sustainability Research Group.

Heiskanen, Eva, Johnson, Mikael, Robinson, Simon, Vadovics, Edina and Saastamoinen, Mika. 2010. 'Low-carbon communities as a context for individual behavioural change', *Energy Policy* 38: 7586-7595.

Hertin, Julia, Berkhout, Frans, Gann, David M. and Barlow, James. 2003. 'Climate change and the UK house building sector: perceptions, impacts and adaptive capacity', *Building Research & Information* 31(3/4): 278-290.

Hess, David J. 2007. *Alternative Pathways in Science and Industry: Activism, Innovation, and the Environment in an Era of Globalization.* Cambridge, MA: The MIT Press.

Hobson, Kersty. 2002. 'Competing discourses of sustainable consumption: does the 'rationalisation of lifestyles' make sense?', *Environmental Politics* 11(2): 95-120.

House of Commons Energy and Climate Change Committee. 2014. The Green Deal: watching brief (part 2), http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenergy/348/348.pdf, last accessed 8 February 2015.

HM Government. 2005. *Securing the Future: The UK Government Sustainable Development Strategy.* HMSO, Norwich.

Hodson, Mike and Marvin, Simon. 2010a. 'Can cities shape socio-technical transitions and how would we know if they were?' *Research Policy* 39(4): 477-485.

Hodson, Mike and Marvin, Simon. 2010b. 'Urban retrofit – from project by project to systemic change', *Town and Country Planning* 79(10): 429-433.

Hommels, Anique. 2005. *Unbuilding Cities: Obduracy in Urban Socio-Technical Change,* Cambridge, MA: The MIT Press.

Hopkins, Rob. 2008. *The Transition Handbook: From Oil Dependency to Local Resilience.* Totnes: Green Books.

Karvonen, Andrew. 2010. 'Metronatural™: inventing and reworking urban nature in Seattle', *Progress in Planning* 74**:** 153-202.

Karvonen, Andrew. 2011. *Politics of Urban Runoff: Nature, Technology, and the Sustainable City.* London: The MIT Press.

Karvonen, Andrew. 2013. 'Towards systemic domestic retrofit: a social practices approach', *Building Research & Information* 41(5): 563-574.

Karvonen, Andrew and Brand, Ralf. 2013. 'Expertise: specialised knowledge in environmental politics and sustainability, in P.G. Harris (ed.) *Routledge Handbook of Global Environmental Politics*. London: Routledge, pp. 215-230.

Karvonen, Andrew and Brand, Ralf. 2009. Technical expertise, sustainability, and the politics of knowledge, In G. Kütting and R. Lipschutz (eds) *Environmental Governance: Power and Knowledge in a Local-Global World,* London: Routledge, pp. 38-59.

Karvonen, Andrew, Evans, James and van Heur, Bas. 2014. 'The politics of urban experiments: radical change or business as usual?' In M. Hodson and S. Marvin (Eds) *After Sustainable Cities?,* London: Routledge, pp. 104-115.

Karvonen, Andrew and Yocom, Ken. 2011. 'The civics of urban nature: enacting hybrid landscapes', *Environment and Planning A* 43: 1305-22.

Kitschelt, Herbert P. 1986. 'Political opportunity structures and political protest: Anti-nuclear movements in four democracies', *British Journal of Political Science* 16(1): 57-85.

Lane, Ruth, and Gorman-Murray, Andrew. 2011. 'Introduction', in R. Lane and A. Gorman-Murray (Eds) *Material Geographies of Household Sustainability*, Surrey: Ashgate, pp. 1-16.

Little, A. 2002. *The Politics of Community: Theory and Practice.* Edinburgh, Edinburgh University Press.

Maller, Cecily, Horne, Ralph E. and Dalton, Tony. 2012. 'Green renovations: intersections of daily routines, housing aspirations and narratives of environmental sustainability', *Housing, Theory and Society* 29(3): 255-275.

May, Tim, Hodson, Mike, Marvin, Simon and Perry, Beth. 2013. Achieving 'systemic' urban retrofit: a framework for action, in W. Swan and P. Brown (eds.) pp. 7-19.

McMeekin, Andrew and Southerton, Dale. 2012. 'Sustainability transitions and final consumption: practices and socio-technical systems', *Technology Analysis and Strategic Management* 24(4): 345-361.

Meijer, Frits, Itard, Laure and Sunikka-Blank, Minna. 2009. 'Comparing European residential building stocks: performance, renovation and policy opportunities', *Building Research & Information* 37(5/6): 533-551.

Moloney, Susie, Horne, Ralph E. and Fien, John. 2010. 'Transitioning to low carbon communities – from behaviour change to systemic change: lessons from Australia', *Energy Policy* 38: 7614-7623.

Moore, Steven A. and Karvonen, Andrew. 2008. 'Sustainable architecture in context: STS and design thinking', *Science Studies* 21(1): 29-46.

Moss, Tim, Guy, Simon, Marvin, Simon, and Medd, Will. 2010. 'Intermediaries and the reconfiguration of urban infrastructures: an introduction', in S. Guy, S. Marvin, W. Medd, and T. Moss (Eds) *Shaping Urban Infrastructures: Intermediaries and the Governance of Socio-technical Networks*, London: Earthscan, pp. 1-13.

Muruyama, Yasushi, Nishikido, Makoto, and Iida, Tetsunari. 2007. 'The rise of community wind power in Japan: enhanced acceptance through social innovation', *Energy Policy* 35:2761-2769.

Newig, Jens, and Fritsch, Oliver. 2009. 'Environmental governance: participatory, multi-level and effective?', *Environmental Policy and Governance* 19(3): 197-214.

Oreszczyn, Tadj. and Lowe, Robert. 2010. 'Challenges for energy and buildings research: objectives, methods and funding mechanisms', *Building Research & Information* 38(1): 107-122.

Paterson, Matthew and Stripple, Johannes. 2010. 'My Space: governing individuals' carbon emissions', *Environment and Planning D: Society and Space* 28: 341-362.

Peters, Michael, Fudge, Shane and Sinclair, Philip. 2010. 'Mobilising community action towards a low-carbon future: opportunities and challenges for local government in the UK', *Energy Policy* 38: 7596-7603.

Putnam, Robert D. 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon and Schuster.

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

Roberts. Simon. 2008. 'Altering existing buildings in the UK', *Energy Policy* 36: 4482-4486.

Rogers, Jenny C., Simmons, Eunice A., Convery, Ian and Weatherall, Andrew. 2008. 'Public perceptions of opportunities for community-based renewable energy projects', *Energy Policy* 36: 4217-4226.

Rohracher, Harald. 2008. 'Energy systems in transition: contributions from social sciences', *International Journal of Environmental Technology and Management* 9(2): 144-161.

Ross, Ben. 2011. *Refit West: Update from the Front Line.* London: Forum for the Future.

Seyfang, Gill and Haxeltine, Alex. 2012. 'Growing grassroots innovations: exploring the role of community-based initiatives in governing sustainable energy transitions', *Environment and Planning C: Government and Policy* 30: 381-400.

Seyfang, Gill, Haxeltine, Alex, Hargreaves, Tom and Longhurst, Noel. 2010. *Energy and communities in transition: Towards a new research agenda on agency and civil society in sustainability transitions*

(WPEDM 2010-13). Norwich: Centre for Social and Economic Research on the Global Environment.

Seyfang, Gill and Smith, Adrian. 2007. 'Grassroots innovations for sustainable development: towards a new research and policy agenda', *Environmental Politics* 16: 584-603.

Shove, Elizabeth. 2010. 'Beyond the ABC: climate change policy and theories of social change', *Environment and Planning A* 42: 1272-1285.

Shutkin, William A. 2000. *The Land That Could Be: Environmentalism and Democracy in the Twenty-First Century.* Cambridge, MA: The MIT Press.

Smith, Amanda. 2011a. 'Community-led urban transitions and resilience: performing Transition Towns in a city', in H. Bulkeley, V. Castán Broto, M. Hodson, and S. Marvin (Eds) *Cities and Low Carbon Transitions,* London: Routledge, pp. 159-177.

Smith, Amanda. 2011b. 'The Transition Town network: a review of current evolutions and renaissance', *Social Movement Studies* 10(1): 99-105.

Spaargaren, Gert. 2011. 'Theories of practices: agency, technology, and culture. Exploring the relevance of practice theories for the governance of sustainable consumption practices in the new world-order', *Global Environmental Change* 21: 813-822.

Stafford, A., Gorse, C. and Shao, L. 2011. *The Retrofit Challenge: Delivering Low Carbon Buildings.* York: Centre for Low Carbon Futures.

Stephenson, Janet, Barton, Barry, Carrington, Gerry, Groth, Daniel, Lawson, Rob and Thorsnes, Paul. 2010. 'Energy cultures: a framework for understanding energy behaviours', *Energy Policy* 38: 6120-6129.

SuperHomes Network. 2015. Superhomes Network website, www.superhomes.org.uk, last accessed 22 February 2015.

Sustainable Development Commission. 2006. *Stock Take: Delivering Improvements in Existing Housing, Sustainable Development Commission, July 2006,* http://www.sd-commission.org.uk/data/files/publications/Stock_Take.pdf, last accessed 12 October 2014.

Swan, Will. 2013. 'Retrofit innovation in the UK social housing sector: a socio-technical perspective', in W. Swan and P. Brown (eds.), pp. 36-52.

Swan, Will and Brown, Phil (eds.). 2013. *Retrofitting the Built Environment,* Chichester: John Wiley & Sons.

Swyngedouw, Erik. 2007. 'Impossible sustainability and the post-political condition', in D. Gibbs and R. Krueger (Eds) *The Sustainable Development Paradox: Urban Political Economy in the United States and Europe*, New York: Guilford Press, pp. 13-40.

Swyngedouw, Erik. 2009. 'The antinomies of the postpolitical city: in search of a democratic politics of environmental production', *International Journal of Urban and Regional Research* 33(3): 601-620.

Transition Town Totnes (TTT). 2015. Community Action Retrofit Delivery website, http://www.transitiontowntotnes.org/groups/building-and-housing/energy-savers/, last accessed 22 February 2015.

UK Government. 2015. Green Deal and Energy Company Obligation (ECO) statistics, https://www.gov.uk/government/collections/green-deal-and-energy-company-obligation-eco-statistics, last accessed 22 February 2015.

Van der Horst, Dan. 2007. 'NIMBY or not? exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies', *Energy Policy* 35(5): 2705-2714.

Vaughan, Adam and Collinson, Patrick. 2015. 'How the Green Deal turned into the green disaster', *The Guardian*, http://www.theguardian.com/money/2014/jan/18/green-deal-green-disaster, last accessed 22 February 2015.

Vergragt, Philip J. and Brown, Halina Szejnwald. 2007. 'Sustainable mobility: from technological innovation to societal learning', *Journal of Cleaner Production* 15(11): 1104-1115.

Vergragt, Philip J. and Brown, Halina Szejnwald. 2012. 'The challenge of energy retrofitting the residential housing stock: grassroots innovations and socio-technical system change in Worcester, MA', *Technology Analysis and Strategic Management* 24(4): 407-420.

Walker, Gordon. 1995. 'Renewable energy and the public', *Land Use Policy* 12(1): 49-59.

Walker, Gordon. 2008. 'What are the barriers and incentives for community-owned means of energy production and use?', *Energy Policy* 36: 4401-4405.

Walker, Gordon. 2011. 'The role for 'community' in carbon governance', *Wiley Interdisciplinary Reviews: Climate Change* 2(5): 777-782.

Walker, Gordon and Devine-Wright, Patrick. 2008. 'Community renewable energy: what should it mean', *Energy Policy* 36: 497–500.

Walker Gordon, Hunter, Sue, Devine-Wright, Patrick, Evans, Bob, and Fay, Helen. 2007. 'Harnessing community energies: explaining and evaluating community-based localism in renewable energy policy in the UK', *Global Environmental Politics* 7: 64-82.

Walker, Gordon, Hunter, Sue, Devine-Wright, Patrick, High, Helen and Evans, Bob. 2010. 'Trust and community: exploring the meanings, contexts and dynamics of community renewable energy', *Energy Policy* 38(2): 655-2633.

Wolsink, Maarten. 2010. Contested environmental policy infrastructure: Socio-political acceptance of renewable energy, water, and waste facilities', *Environmental Impact Assessment Review* 30(5): 302-311.