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Towards a Sustainable Economy? Socio-technical Transitions in the Green Building Sector

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Abstract

Making the transition to a green economy is a major policy driver in the UK and other countries. Entrepreneurs are suggested as being at the forefront of this transition and as a driving force for sustainability. These “green entrepreneurs” or “ecopreneurs” may represent a new type of entrepreneurial behaviour combining economic, environmental and social aims. Buildings have significant impacts on the environment, both in terms of materials and post-construction energy demands – niche innovations have the potential to enact a transition towards more sustainable building practices. In this paper we present empirical work conducted with green entrepreneurs in the UK green building sector . Drawing on sustainability transitions theory , we examine the role of green entrepreneurs in affecting change and suggest that niches are less consensual than previously theorised, these sub-niches may have conflicting views on green building practices and appropriate technologies whilst cohering to the broader view on the need for more sustainable buildings.

Key words: UK; green entrepreneurs; green building; multi-level perspective; sustainability transitions.

1. Introduction

The threat of a changing global climate is now accepted, as is the notion that this is, in part, a consequence of the adverse environmental effects from certain economic development activities, requiring fundamental shifts in Western ways of living away from energy intensive fossil fuel economies. Buildings have been associated with significant climate change impacts, yet also represent an area which can readily be tackled through existing methods and new innovations. Climate change per se has become a mainstream issue and key challenge for international, national, regional and local policy makers in the twenty-first century, with a specific emphasis on low carbon economies incorporating low carbon building techniques and technologies. Nevertheless, economic development strategies and policies have remained wedded to a high growth, carbon-based, consumer-led economy where success is measured by increasing Gross Value Added (GVA) and ever-higher levels of personal consumption (Jackson, 2009).

More recently, however, there has been much greater policy debate around the potential for (radical) change to existing socio-economic development pathways (Forum for the Future 2011). In this debate, environmental challenges are seen as economic opportunities as opposed to barriers, through low carbon initiatives and the development of the so-called green economy, in an attempt to reduce the amount of greenhouse gases being emitted and so alleviate climate change (see for example, Smith et al., 2010; Davies and Mullin, 2010). Nations, regions and cities have begun to try and position themselves as leaders in this new green or low carbon economy and as destinations for new forms of investment. Effectively, future economies and societies are envisaged as being (radically or partially) different from current forms (e.g. building types will change, energy will come from renewable sources, vehicles will use different fuels, new sectors and types of jobs will be created, while older ones disappear etc.), but fundamentally our commitment to capitalist, consumer-led economies is envisaged as remaining much the same. Ecological modernisation is the guiding principle here, at the heart of which is a belief in technology, innovation and progress to solve environmental problems (Spaargaren and Mol 1992; Roberts and Colwell, 2001; Mol, 2002). Thus the green economy is increasingly becoming a mainstream source of policy responses and initiatives in the developed world (Barry and Paterson 2003; Barry and Doran 2006), particularly in response to the global financial crisis and to address issues of energy insecurity associated with dependence on diminishing sources of oil.

Contemporaneously, there is increasing interest in the emergence of a new type of business formation which seeks to *radically* alter mainstream economic activity, led by green entrepreneurs. Green entrepreneurs (or ecopreneurs) are defined as combining environmental *and* business goals in a drive to shift the basis of economic development towards greater sustainability and seeking to achieve the social and ethical transformation of their business sectors (Isaak, 1998: 87; Tilley and Parrish, 2006). Green entrepreneurs may be “social activists, who aspire to restructure the corporate culture and social relations of their business sectors through proactive, ecologically oriented business strategies” (Isaak, 1998: 88), challenging conventional views of entrepreneurs as self-interested profit seekers who simply see the green economy as another business opportunity. Green entrepreneurs who combine environmental awareness with entrepreneurial action may be in the vanguard of a shift to a new form of capitalist development directly helping to address climate change and therefore will be instrumental in any move or transition towards a green or low carbon economy (Schaper 2010; Beveridge and Guy, 2005). Green entrepreneurship draws on the long-standing concept of creative destruction (Schumpeter 1934) in entrepreneurship research, whereby entrepreneurs create new products, processes and

working methods that challenge and overturn conventional methods, which become the driving force for a new holistic and sustainable economic–environmental–social system. Some researchers have suggested that “we may be on the edge of a new wave of creative destruction with the potential to change fundamentally the competitive dynamics in many markets and industries” (Larson 2000: 315). Furthermore, Willis *et al.* (2007), drawing on the work of Christensen, call such entrepreneurs “disruptive innovators” who actively seek to transform and supersede incumbent business models and user expectations. Thus, environmental entrepreneurship and the potential for substantive environmental improvement is increasingly important, with emerging market developments in renewable energy, green building, natural foods, carbon emissions, and other sectors (Dean and McMullen 2007: 51). Our focus in this paper is upon the green building sector, drawing on evidence from the UK. Researching green entrepreneurship in the context of green building advances our understanding of the impact of innovative individuals and organisations, on both the environment and on other businesses (Beveridge and Guy, 2005: 668). This represents a substantial shift away from approaches which see economic development as the antithesis to environmentalism. Rather, it argues that green entrepreneurial activity will be increasingly central to future market success.

Green entrepreneurs may therefore operate their businesses in ways that run counter to popular perceptions of entrepreneurial behaviour (Hart, 2006), display a different mentality and a greater concern for the future implications of their business activities (Harvey, 2007). They may reject being thought of as entrepreneurial if this is associated with profit maximisation, materialism and aggressive behaviour (Friedman and Phillips, 2003; Nicholson and Anderson, 2005). Indeed, many green entrepreneurs are happy to advertise their “alternative” credentials through their own publicity, promotional material and websites and may actively cultivate their image as being outside the mainstream of business. Of importance here then is the performativity of green entrepreneurs or what Schauch (2009) terms the “identity of enactment” whereby they stress their individuality and their alterity, often over their business acumen. For example, the UK energy company Ecotricity states on its website that the company consists of “environmentalists doing business, not a business doing the environment”¹ and Dale Vince, CEO of Ecotricity, in his blog states “I’m a hippie, I run a business...to bring change to the world”².

However, and critical to our argument here, this focus on individuals as change agents is problematic. Some academic work has focused upon high profile green entrepreneurs such as Anita Roddick of The Body Shop, Ben Cohen and Jerry Greenfield of Ben and Jerry’s and Yvon Chouinard of Patagonia (Isaak, 1998; 2002) and closely identifies the personality and ideals of individual entrepreneurs as the major factors influencing company strategy (Schaltegger and Wagner, 2011). Despite critiques, the notion of the individual ‘entrepreneurial hero’ remains pervasive in conventional entrepreneurship research (Nijkamp, 2003). In the case of the green economy, this emphasis on the role of charismatic and pioneering individual green entrepreneurs is a simplistic solution, whereby if we only had *more* of these individuals, environmental problems would be solved.

This omnipresent focus upon individuals has led to a neglect of the multiple factors at work and the role of supporting infrastructures at the national and local scales (Cohen, 2006), which contribute towards creating a supportive environment for entrepreneurship (Neck *et al.*, 2004: 192). Here, we seek to overcome this tendency and make space for considering “the interplay of

¹ Accessed 7/6/11.

² Zerocarbonista.com.aboutme, Accessed 7/6/11.

competing discourses of business and the environment, the flow of national and local technology politics, the trade-offs, compromises, deals and conflicting visions that frame and reshape innovation processes” (Beveridge and Guy, 2005: 672).

Our focus here, then, is on examining green entrepreneurs as one set of actors who are trying to promote their vision of an alternative way of doing business and who may be attempting to shift the basis of social relations in their sector. Nevertheless, green entrepreneurs do not operate in isolation but have a symbiotic relationship with the evolving economic and social structures around them (Walley and Taylor, 2002: 33), including other businesses, institutions and consumers. Although there is not scope to expand on the role of residents or occupants on living with sustainability in the home, this is an important area with an established literature (see Hargreaves et al., 2010; Day-Biehler and Simon 2011 for example).

Science and technology studies provide a suite of theories which offers the potential to remedy these shortcomings, in particular work which has focused on socio-technical transitions to provide a more nuanced analysis. Our purpose in this paper is to explore the development of green entrepreneurship from the theoretical perspective of socio-technical sustainability transitions, using empirical research with UK green building entrepreneurs and specifically their relational approach with other green entrepreneurs, policy frameworks and other actors both in the green building niche and the wider regime. Here we draw on the Multi-Level Perspective to reconceptualise niche structures and the role of green entrepreneurs in facilitating a transition towards a more sustainable economy through challenging building practices in the mainstream construction regime. Hence we seek to problematise the ways that niches and entrepreneurs are conceptualised, and suggest that multiplicity, messiness and relationality need to be incorporated into these theoretical models to encompass a more critical view of socio-technical niches. Conceptually, this allows us to move beyond a focus upon entrepreneurs as lone actors, and to consider green entrepreneurs as one of many actors working to embed niche innovations within the mainstream regime. In light of this critique, a key question is the extent to which green entrepreneurial activity *does* represent an exemplar of the shift towards a new business paradigm of a green economy or merely the exploitation of socio-technical niche markets that will remain small-scale? More specifically, we address the following questions, drawing on empirical material from in-depth research with green entrepreneurs in the UK green building sector:

- How do green entrepreneurs relate to supporting infrastructures and the wider regime in creating opportunities for, or barriers to, the adoption of sustainable niche innovations?
- What are the policy implications of green entrepreneurial activity?

2. Methods

Our research specifically aimed to undertake an in-depth study of green businesses in the UK. This involved 55 in-depth interviews with businesses in the green building sector (such as architectural firms, green building materials suppliers and developers, and green builders participating in a diverse range of green building practices) and support organisations, including banks and other sources of finance, business advice and support, specialist organisations campaigning on behalf of the sector, and so on. Potential research participants were identified from exhibitors at events such as EcoBuild and GreenExpo, online membership databases of organisations like the Association for Sustainable Building, internet searches and snowball sampling. Research participants were approached by letter or telephone, with the majority of interviews conducted

face-to-face. Interview schedules were loosely based around a set of core questions; given the variety of businesses involved in the research, interviews were semi-structured to allow flexibility. All interviews were recorded, transcribed and qualitatively analysed using Nvivo to structure analysis themes. The primary focus of the research has been upon small and medium sized enterprises (SMEs) in the private sector to specifically explore the motivations of green entrepreneurs in combining business with the environment.³ We recognise that (green) entrepreneurialism is not limited to the private sector and that some social and community enterprises may operate with commercial principles (Seyfang and Smith 2007; Seyfang and Longhurst 2012; Davies 2012).

3. The Green Building Sector

As a case study sector, green building offers significant advantages for investigating sustainability transitions. Green and sustainable buildings provide an important means of meeting the policy goal of an 80% reduction in UK carbon emissions by 2050 from 1990 levels (DECC 2008; King, 2010) given that buildings presently account for some 45% of carbon emissions. Construction and housing have been identified as priority action areas by the European Commission and United Nations⁴, offering opportunities for improved environmental performance, business development and job creation for SMEs (Vickers and Vaze, 2009; CBI, 2007; European Commission, 2011). As such, green building is discursively constructed as a source of business and employment growth, as well as a major source of emission reductions. However, although low carbon and environmentally friendly building practices have been on the UK government agenda for at least the last decade, little progress has been made in moving such practices into the mainstream, beyond bolt-on technologies such as renewable energies (cf. Smith, 2007; Lovell and Smith, 2010; Porritt, 2011).

Green building practices have emerged from counterculture movements which were concerned about resource use and wastage, the energy intensity of mainstream masonry building methods, and a desire to be detached from the constraints of modern infrastructures (i.e. off grid) such as through autonomous housing projects (Vale and Vale, 2000). Innovations and experiments with materials and designs to reduce environmental impact emerged from these niche experiments, not all of which are compatible with current UK building regulations and planning policies. Despite recent growing interest and government policies to encourage more sustainable housing (DCLG 2007), in the UK green building persists as a niche market (Smith 2007) in relation to the mainstream regime of traditional brick and block building methods, with its associated practices of materials suppliers, labour supplies, insurance and finance (Lovell and Smith, 2010). Our analysis here synthesises thinking on green entrepreneurs with transitions theories relating to the role of socio-technical niche actors and innovations in changing mainstream building practices.

4. Transition management and strategic niches – what role for green entrepreneurs?

³ We are specifically interested in radical green entrepreneurs rather than what has been termed intrapreneurial activity within large firms, such as Marks and Spencer's Plan A, as well as what many firms involved in the research saw as 'greenwash' from larger companies seeking to 'jump on the bandwagon'.

⁴ See <http://www.unep.org/sbci/> United Nations Sustainable Building and Climate Initiative.

We have argued that concentrating on lone entrepreneurs as drivers of socio-technical change is a flawed approach, and that wider recognition of contextual factors and relations with wider actors should be acknowledged. One way of addressing the relationality of green entrepreneurs is by drawing on theories from social studies of technology. This corpus of theories is useful for investigating the transformation of technological regimes and examining the role of innovative technological strategic niches in transitions (Rip and Kemp, 1998; Smith, 2003; Geels, 2005; Schot and Geels 2008), thus offering a way to address theoretical shortcomings in the green entrepreneurial literature. Socio-technical transitions theories can be advantageous for researching green entrepreneurial activity as they focus on “innovative experiments in alternative, sustainable technological niches and draw lessons from the challenges they face in the context of a dominant, unsustainable technological regime” (Smith, 2003: 128). More specifically we draw on the multi-level perspective (MLP) of innovation which:

“distinguishes a micro-level of protected niches, functioning as test-beds for the emergence of new socio-technical constellations, a meso-level of socio-technical regimes (such as energy systems) and a broader context of the socio-technical landscape, which encompasses cultural norms, values and persistent socio-technical structures” (Späth and Rohracher, 2010: 449).

Figure 1 illustrates how the MLP is theorised as a nested hierarchy, consisting of small-scale niches developing innovations and novelties, which aim to engender change at the regime level, through promoting the innovative socio-technical systems in a broader context.

FIGURE 1 about HERE

Figure 1. Multiple levels as a nested hierarchy (Geels 2002)

As shown in Figure 1, the landscape represents the macro-level context within which regimes operate, and is conceived as being the most stable level. Transition pathways can occur as a result of landscape pressures, thus stimulating change in the regime (Geels and Schot 2007). Sitting under the landscape, socio-technical regimes consist of “interconnected systems of artefacts, institutions, rules and norms” (Berkhout et al., 2003: 3), and are often represented as being largely physically and socially inert (Bulkeley et al., 2010: 31), leading to path dependency and lock in (Berkhout, 2002; Unruh, 2002). One driver to dislodge extant socio-technical regimes may be through the actions of green entrepreneurs, both through their own business activities as well as through lobbying for wider system change. Geels (2010: 498) suggests that “a common pattern is that outsiders and entrepreneurs nurture and develop radical innovations in niches “below the surface” of incumbent regime actors”, leading some green entrepreneurs (and other actors) to act as *system builders* who aim to actively create changes in the wider economic system (De Boer et al, 2009). Thus “pragmatic systems builders who make compromises and help translate some niche practices into forms amenable to actors in the regime” are important (Smith 2007: 447). In terms of developing a green economy, it is argued that “the core task is to figure out how currently dominant socio-technical regimes might be dislodged and replaced, and how new configurations might become mainstream” (Walker and Shove, 2007: 219).

In contrast, niches are seen as “nurturing socio-technical configurations, which grow and displace incumbent regime activities” (Berkhout et al, 2003: 9). Niches have the potential to transform technological regimes either by responding to, or creating, tensions (windows of opportunity) within prevailing regimes. These tensions result from changing circumstances in the regime or

wider “socio-technical landscape” and present opportunities for regime transitions, for instance tensions such as growing policy emphasis on climate change, carbon reduction targets and policies for developing green economies can all help to challenge existing technological regimes (Smith et al., 2010). Tensions may therefore create space, within which green entrepreneurs can operate successfully by creating appetite within the regime for niche innovations. New socio-technical configurations that may have matured in specific niches can offer potential solutions to problems in the regime, either by conforming to regime conditions or, more radically, challenging and transforming regime practices (Smith and Raven, 2012; Truffer, 2008: 976). Niches which are more radical or which do not sit so neatly with the existing regime may find it more difficult to break through into the mainstream socio-technical regime. In contrast, other niches may find translation easier as a result of their closer alignment to the regime, although it may be that only convenient aspects are appropriated (Smith, 2003), but in the process losing the more radical, and transformative aspects which may reduce the sustainability of niche innovations (Smith and Raven 2012).

Figure 2 illustrates the processes and dynamics of the MLP and how innovations from within niches may broaden out to challenge the regime, with the landscape both influencing, and being influenced by, the regime. Depicted in this way, the MLP again assumes a degree of linearity and natural forward progression, envisaging processes of change as being highly structured. Figure 2 attempts to incorporate a sense of the temporal shifts whereby niche innovations are diffused, scaled up and translated into regimes and landscapes. It endeavours to incorporate a messier approach to changes within particular systems, yet, it remains a predominantly structural conceptual model.

FIGURE 2 about HERE

Figure 2. The Multi-level Perspective on Socio-technical Transitions (Geels, 2002)

Critically, the value of socio-technical transitions approaches for a study of green entrepreneurship is that they stress not just actions by individual entrepreneurs, but also “the networks and support structures that have built up to help these alternative forms of sustainable practice” (Smith, 2003: 128), helping us to move away from the notion of the lone entrepreneurial hero. Indeed, work within science and technology studies has long helped to debunk the idea of individual heroes in the development of science and new technologies (see Bijker, 1997). Green entrepreneurs are one set of actors amongst “the “idealists” (producers and supportive users) who initiate a sustainable niche [and] are later joined by entrepreneurial “system builders” (who open the niche out to a wider set of users) and, eventually, by serious amounts of capital seeking to profit from the proto-regime” (Smith, 2003: 130). This helps us connect the activities of individual green entrepreneurs to wider economic and social structures and indicates the kinds of broader changes that may be necessary to develop a green economy. Green entrepreneurs are part of a complex and interrelated web of actors both within and beyond the niche.

5. Green Entrepreneurs in Socio-technical Context: Building Socio-Technical Transitions

Green entrepreneurs are not the only actors involved in socio-technical transitions, nor are they passive actors in such processes. Green entrepreneurs may attempt to actively shift institutional arrangements, either in order to widen the niche and/or to engender a more substantive shift in the conditions in which they operate (Schaltegger and Wagner, 2011). De Boer et al., (2009:6)

argue that system building entrepreneurs adopt a range of strategies to change the system context including lobbying for regulatory change, building new partnerships and changing sectoral habits and practices in order to engender a transition towards sustainability. Such efforts may be particularly effective if combined with economic growth which may lead to enhanced political influence and bargaining power by green entrepreneurs and their industry associations in order to lobby for regulatory change (Geels, 2010). This may enable incorporation into the existing mainstream or, more substantively, green entrepreneurial activities may *become* the new mainstream (Meek et al., 2010). However, it is far too simplistic to assume that regime change begins in niches and simply works its way hierarchically up (as suggested in figures 1 and 2) to create broader changes (Hodson and Marvin, 2010) rather, it is more likely to be a chaotic process (Bulkeley et al., 2010). Indeed, the MLP has been criticised for its overly structural approach to change, with recent research suggesting that it is a relational and messy process (Maassen 2012).

Whether niche building results in sustainability transitions may be affected by the extent to which green entrepreneurs define themselves as an alternative to, or outside, the mainstream. Some green entrepreneurs may wish to stay true to the original principles of the niche, whereas those seeking wider influence (system builders) may be regarded as sell outs and create tensions within the niche (Seyfang and Smith, 2007). Niche pioneers and their ideas can also be subsumed by larger, more powerful commercial ventures as elements of niche activities become incorporated into the mainstream, or where the mainstream technological regime transforms the niche rather than the reverse as has been the case with organic food (Smith 2006; Guthman 2003) and fair trade niches⁵ (Hockerts and Wüstenhagen, 2010).

While the reflexive approach of transitions research may help address some of the shortcomings of work which focuses on individual actions by green entrepreneurs, it frequently lacks any real sense of the politics and power relations involved between the different actors and institutions that may facilitate or hinder the transition. Indeed, associated political commitments will be necessary if “radical shifts to sustainable technological regimes entail concomitantly radical changes to the socio-technical landscape of politics, institutions, the economy and social values” (Smith, 2003: 131). Transition is therefore not inevitable, but the outcome (or not) of struggle, agency and power relations, something which may be hidden by strategic niche management approaches that extrapolate from historical studies⁶ (Smith, 2004; Shove and Walker, 2007). The question of whether socio-technical regimes can be guided intentionally towards more sustainable outcomes remains an open question in much MLP research (Späth and Rohrer, 2010). Certainly niches are important sources of innovation that may offer solutions for tensions in existing socio-technical regimes, but the “adaptation process is confined by structures within the existing, mainstream regime” (Smith, 2006: 453). Indeed, it may be that existing socio-technical contexts close down spaces for alternative approaches (Shove, 1998). In the following sections we further critique the characteristics of niches, in particular the homogeneity of niches, as well as examining the ways that policy-makers interact with green entrepreneurs can be both supportive and obstructive to sustainability transitions, drawing upon our empirical research.

⁵ This has also been the case with several of the ‘exemplar’ green entrepreneurs mentioned earlier – Anita Roddick’s Body Shop was purchased by L’Oréal, Ben and Jerry’s by Unilever.

⁶ Smith (2004) makes this same point through a comparison with the Alternative Technology movement in the UK. This movement had a keen awareness of the need to consider political and economic power structures.

5.1 Divergence in Green Building Practices

Green building is not a homogeneous sector and is most usefully viewed as being a diverse and wide-ranging sector that incorporates a multitude of practices, rather than being a cohesive set of agreed practices. “Green” building might include a spectrum of approaches to reducing the environmental impact of construction (embodied energy) and post-construction building use; from low-technology building materials such as straw, hemp or rammed earth installations to high-technology installations such as biomass boilers, ground heat source pumps, rainwater harvesting, and solar panels, as well as the retrofitting of more conventional “brick and block” buildings utilising bolt-on technologies such as solar photovoltaics and additional insulation. Consequently, defining what is or is not a green or sustainable building is difficult, and contested, hence Guy and Osborn (2001: 91) accord with Cook and Golton (1994, in Guy and Osborn 2001) that green buildings should be treated as a relative rather than absolute concept. Our research reinforces this point, and this relationality could be conceptualised as the green building niche being further delineated into niches within niches each with their own relational actors and practices (e.g. rammed earth niche, straw bale niche, low energy technology niche etc.). These varying elements of the green building niche have differing conventions and practices rather than having common practices with all niche actors working towards an agreed target of getting niche innovations incorporated into the mainstream regime.

In particular, we found that green building techniques are far from agreed,⁷ and there are contradictions or tensions *within* so-called green building practices further complicating what constitutes sustainable building. The German concept of Passivhaus exemplifies this as one area that provoked divergent views amongst our interview respondents. A “Passivhaus” is one that has, according to the promoters, excellent thermal performance through thick insulation and exceptional air-tightness with mechanical ventilation.⁸ Some respondents saw Passivhaus as the best way forward, even suggesting that to build otherwise would be ‘immoral’, whereas others were more cautious due to the construction techniques involved, the sustainability of the materials used and the associated high costs. One interviewee saw Passivhaus as leading to unhealthy buildings “wrapped in plastic”⁹ in order to achieve the Passivhaus requirements for sealing; he questioned the benefits of such an approach, indicating that for him natural, breathing walls with intrinsic thermal properties would be a better approach. Conversely, Tofield (2012) recently asserted that Passivhaus exemplifies the best way to ensure low energy buildings and meet climate change targets. Such a diverse range of approaches to green building and varied beliefs about which represents the best way forward are both strengths and weaknesses for green building. Certain approaches can be prioritised and gain policy ascendancy to the extent that other ideas and philosophies are excluded, for example Passivhaus, although it has detractors, has many advocates and may be adopted as a new industry standard.¹⁰ However, while Passivhaus offers many advantages it is only *one* solution, rather than *the* solution – other green building

⁷ Indeed, globally green building is intrinsically spatially variable as people take advantage of locally available building materials (see Pickerill (2011), thus creating vernacular architectural styles.

⁸ See www.passivhaus.org.uk for details.

⁹ This has also been described as ‘plastic bags propped up by a timber structure’ <http://www.sudobe.com/blog/2009/02/19/passivhaus-for-not-so-passive-occupants/> (accessed 25 March 2013).

¹⁰ Some planning authorities stipulate that building should be Passivhaus standard, or almost Passivhaus level, for example Brussels City Region.

practices exist (Williams 2012) including those which are concerned with lower embodied energy and natural materials. In his blog, Grant¹¹ notes such contentions within the green building niche, specifically how both advocates and opponents of Passivhaus as well as “people who refuse to use cement or petrochemical-based insulation [as well as] those that routinely do” can all identify themselves as being “green builders” and belong to the same green building association. Such divergence makes interaction with policy makers and other support institutions potentially fragmented, with the potential for certain ideas to be adopted more readily than others (Kingdon 1995) depending on current contexts and priorities. For example, policy instruments such as the UK’s Code for Sustainable Homes can embody such preferences and affect what type of green building is adopted. Some green building practices can perform poorly using these metrics, while others which are less sustainable can perform better, as one green builder explained:

“I’m not a fan of it, the way you can score points to hit certain targets is slightly dubious I would say, depending on where you are in the country, or in the city or rurally. I don’t think it’s an accurate way of awarding people points if you like for building in a green way. I mean for instance we’ve just – Passivhaus, which has become quite popular in inverted commas recently – doesn’t get anywhere near the Code for Sustainable Homes, but in terms of energy use, it performs far better. I just think it’s a bit dubious; there needs to be a different way of awarding and scoring points on it.”

This divergence of views on the most appropriate building techniques and styles means that we should think about green building, as well as niches in other sectors, as encompassing a range of sub- or ‘nested niches’, rather than there being a consensus amongst practitioners. Hybrids also emerge as ideas move into mainstream construction, and as particular types of technologies are encouraged into the mainstream by schemes such as the UK’s Code for Sustainable Homes or the Feed-in-Tariffs.¹² Moreover, as others have suggested (Greenwood 2012; Mauruszat 2001), however ‘green’ a house is, and how many low carbon or energy efficient technologies it includes, it is ultimately the behaviour of the occupier that has the greatest impact on the energy performance, as one respondent clearly illustrates:

“I mean you can get low flow showers, A+ rated washing machines, you can put low...wattage bulbs in and all that kind of stuff, but if someone leaves it on all day then it’s going to use more than...and you know if they’re going to decide they want a massive fridge or a telly (sic) that takes up half the wall, then that’s their choice and that’s going to undo to an extent all the goodness that’s been done!”

This highlights an additional nuance in green building, one that cannot be controlled through design features or technology, but which is clearly related to social and cultural practices within the home. Although not specifically the purpose of our research, such aspects are important and require further research as behaviour fundamentally affects building performance, especially

¹¹ (<http://www.elementalsolutions.co.uk/blog-2/> accessed 18 October 2012)

¹² The Code for Sustainable Homes is the national standard for the sustainable design and construction of new homes. The Code aims to reduce UK carbon emissions and create homes that are more sustainable. The Feed-in-Tariffs were introduced through the UK Energy Act 2008 and encouraged the installation of small-scale (less than 5MW) low-carbon electricity generation, by offering payments for electricity generation as well as payments for surplus power sold back to the national grid.

when some green building approaches do not account for this but base their performance on design-stage models without considering how buildings are used by the occupants.

While some niche actors may act as systems builders to encourage the adoption of niche innovations and practices by the mainstream regime, others view remaining within a niche as essential. Indeed, some respondents felt that if their products and practices were becoming mainstream they would actively seek out new products and practices which enabled them to remain distinct from mainstream actors, with niche-ness forming part of their 'identity of enactment'. This was not universally the case for all green entrepreneurs, but for a minority of respondents being niche is not something that they wish to dispense with – thus these green entrepreneurs are unlikely to act as 'system builders'. Many suggested that they strive to remain niche, despite some difficulties in achieving this as mainstream operators adopt their practices – this placed an onus on some green building businesses to keep at the cutting edge, constantly innovating to retain their niche status. Although mainstream operators followed the path of such businesses, this was not always seen as desirable, as one business explained:

“...the [sustainability] award ... was for being at the cutting edge and for always sort of moving things. I mean that's our kind of...a plus and a minus as well 'cause...the big boys always follow us and, and then we you know, we're always having to keep at the cutting edge but also you know, we kind of open out the market for everyone, in a way.”

While many green building businesses do want mainstream building to become more sustainable and thus engender a regime shift, they would like to retain a degree of market differentiation. Niche originators suggested that whilst far from being the mainstream, green building may be expanding beyond the original niche, one green architect suggested “when I started it was actually a little bit too early and now it's almost too late...people are kind of sick of it, I think”. Another green building company thought that in the future “everyone and their dog will have a green system and there's just going to be more and more competition” indicating the anticipated progression of niche ideas to the mainstream. Although there can be the assumption that everyone is now familiar with green building techniques, and that people are 'sick of it', another architect described a surprising discussion with a client who was in favour of green building:

“I sort of assume everybody knows about it now. Because I was talking about solar shading and stuff thinking they'd know it because they deal with very sustainable stuff but they didn't know, they'd never heard of it. They'd not even really considered solar gain or anything like that.”

It may be that certain ideas or practices have been adopted by mainstream actors whilst certain 'innovations', such as solar gain, remain part of the niche for the time being. One way of translating such ideas into the mainstream is by engaging in learning activities to encourage their uptake, as described by one green entrepreneur:

“I assume that we won't find builders who have experience in these kinds of products! With every project that we get I'm assuming that I will have to go to site and show, actually physically show the guys how to install it and how to use it, you know do a bit of trouble-shooting along the way”

In addition to the complexity within niches themselves, there is considerable complexity within institutional frameworks and social contexts, and in the interactions and relationships between these actors. The next section will explore the ways in which policy-makers are seen to both help and hinder those working in green building in the UK.

5.2 Policy Making for a Greener Future?

The UK government is particularly keen to encourage a green economy in general (HM Government 2011) and more sustainable housing in particular (DCLG 2007; 2008), with the current Conservative-Liberal Democrat government claiming to be the “greenest government ever”. A raft of policy and fiscal measures have attempted to increase the extent of green building in the UK, yet it is frequently inconsistent, subject to significant changes (and even U-turns) and encourages particular types of green building at the expense of other available techniques and technologies. High profile initiatives such as the Code for Sustainable Homes, Energy Performance Certificates, the Feed-in-Tariff, and the Green Deal all aim to improve the energy efficiency of UK homes and thus reduce greenhouse gas emissions from housing yet all are subject to criticism. While some research respondents have found government policy to be very supportive of their business, indeed even leading to growth, others have been more critical. At the local scale, planning policy implementation by local government can represent a major barrier for sustainable green housing as policies and regulations were not developed with these types of houses and building methods in mind and many local planning officers are not familiar with such techniques (Seyfang 2010). Green design features and technologies may also be lost in the process of translation from architectural design to actual completion on the ground as negotiations and compromises are made (Mauruszat 2001). One green architect described similar experiences before construction even started where green designs had to be curtailed in order to satisfy planning criteria:

“the one we did round there...nobody could see it, not even the neighbours, and they just wouldn't accept render. It had to be brick 'why?' give us a logical reason. I personally would've fought it, but we gave the client the option and they went 'oh we need to get it built so let's just give in a little,' which is just frustrating for us...because it's not my house, it's not for me to keep going when they're not going to get planning.”

From a national perspective, there has been inconsistency in government policy, notably around the Feed-in-Tariff, but also regarding what the Green Deal¹³ actually constitutes and when initiatives such as the Renewable Heat Incentive¹⁴ (RHI) will commence. Many green businesses reported that policy needs to be consistent and well planned yet many suggested that:

“...the government seems to be slightly behind the times. Sometimes they're ill-advised and – and for instance, we've been hearing about the Green Deal and yet it just seems to be one delay after another. People are often asking us 'well what about the Green Deal?'

¹³ The Green Deal is a government schemes which encourages energy-saving home improvements, like insulation. Payments for these improvements are taken from the electricity bill and these repayments should be less than the money saved as a result of those energy efficiency improvements. It was launched in January 2013, after the research interviews took place.

¹⁴ The Renewable Heat Incentive (RHI) is a UK government initiative to increase the use of renewable fuels for heating by providing financial support – the non-domestic sector is already eligible but the domestic scheme has yet to be launched.

It's not happening yet. Our advice is ignore the Green Deal. If you want to do it, do it. If you don't want to do it, don't do it, but don't worry about the Green Deal, because if you hang on for that it might not happen."

In terms of influencing policy to encourage the take up of niche practices (i.e. translation), Seyfang (2010) suggests that this could be encouraged by providing notice of upcoming opportunities to influence policy through consultations. However, this makes a number of assumptions about information flows, capacity, interest to take part and the likelihood of exerting such influence. Albeit this point is made in the context of grass-roots community innovations rather than for green entrepreneurs, but many similarities exist, in that individuals may not have the individual capacity (time and other resources) or interest in such activities. Such atomised behaviour is less likely to achieve change and might suggest why (many) businesses prefer that organisations influence policy on their behalf:

"Well, we're members of a couple of bodies like the Association for Sustainable Building and there's one in Bristol called the Green Register. But to be honest beyond that we wouldn't, there seems to be very little time for that anyway."

Some businesses expressed concerns about this disconnect with policy makers, and that as a result the sector is losing out to larger businesses which have "jumped on the bandwagon" – for example regarding the negotiations of the Green Deal the UK government was reported as having only consulted with large corporations like B&Q¹⁵ to the exclusion of smaller green building firms. For example, Craig White, of White Designs and Modcell, comments that the Green Investment Bank¹⁶ may prioritise funding for larger companies but that he "would like to see investment going to towards smaller companies, which are growing fast and creating jobs. It is easier for large companies to speak to Government and harder for small and medium sized enterprises like ours to engage, but we are more agile."¹⁷

Evidence-based policy is the cornerstone of UK government policy making, yet there is currently considerable evidence that the performance of some green building materials and technologies is uncertain, and that much can depend on the quality of the installation or construction, as well as how the building is used post-construction (see Lovell 2008 for the UK; Mauruszat 2001 for Germany), giving rise to a more serious concern that estimates for energy performance of new homes overestimates the savings to be made, leading to an "energy performance gap" (Tofield 2012), especially when policy frameworks such as the Green Deal are based on such premises.

While the MLP conceptualises regime tensions and landscape pressures as creating windows of opportunity for niche innovations to be translated to the regime or even to become the new regime, it may be in some circumstances that particular tensions can close down windows of opportunity that may have been created by other tensions, so that potential opportunities are negated. This can work against sustainable transitions, for example if those transitions rely on

¹⁵ A large UK multiple retailer of do-it-yourself building and gardening products.

¹⁶ The Green Investment Bank is a government initiative to stimulate green investments in renewable technologies, energy efficiency and support the Green Deal (<http://www.greeninvestmentbank.com/> accessed 15 April 2013)

¹⁷ <http://www.modcell.com/news/modcell-the-times-budget-2012/> (accessed 19 June 2012).

conventional investments and capital to be enacted. As one green building entrepreneur explained “I think it’s a sad combination that we’re at this point when everyone needs to invest in more sustainable futures [yet] the whole financial market is just about to...go pop really, it’s bad timing for anyone to put big money in.” Commitment to conventional regime practices are ingrained and capitalist notions of returns on investment and profit are hard to relinquish, and make convincing consumers (i.e. the domestic and commercial purchasers of green buildings and specific technologies) of the value of green building technologies difficult:

“everyone is very sceptical of green materials, they’re very dismissive of the extra cost and you know ‘why the hell am I spending more [in] times like now when we’re in a recession, why the hell would I want to spend more on my building project rather than less?’”

This is pushing green entrepreneurs to operate on lower margins, in particular given that green building technologies often cost more to start with:

“[we’re working on a] gross margin of probably fifteen per cent, maybe twenty per cent and less on bigger projects so you know the margins are tight, but you need to be able to do that to be able to compete with mainstream building methods”

In addition, banks are risk adverse, stipulating unrealistic criteria on green entrepreneurs, which whilst likely to also affect ‘other’ entrepreneurs, does not encourage the development of a green economy as promoted by policy-makers. Financial returns outweigh attempts to save the environment, and the image of hippies and tree-huggers is one that green builders are keen to shake off. Not only that, but policies encourage certain types of technologies at the expense of other alternatives which may be more appropriate in a given context. Greenwood (2012: 174) observes that the Code for Sustainable Homes encourages particular technologies to be installed without critically evaluating the suitability of such technologies in particular locations, and that it has a distorting effect on green building practice. Regime frameworks such as policy structures, funding programmes and certification schemes (e.g. Code for Sustainable Homes or LEED¹⁸) can encourage particular forms of greening, to the exclusion of more radical, and potentially more sustainable, alternatives – we need to bear in mind what is left out when practices become codified and regulated (see Lovell, 2008). For example, the UK Code for Sustainable Homes accords a higher weighting to certain practices, whilst not valuing other green building technologies:

“the methodology is different and so a Passivhaus can get quite low points for Code for Sustainable Homes. I think as well, people have got distracted by this Code for Sustainable Homes, and [it] keeps getting revised and, and, actually you know, it doesn’t sit very well with Passivhaus.”

Furthermore, initiatives such as the UK government’s zero-carbon homes with its requirement for on-site energy generation to meet consumption needs potentially leads to “perverse efficiency measures being required for sites less suited to on-site renewables” (Grant 2012) rather than taking a broader view of life-cycle emissions where certain types of technology are promoted regardless of local context. Thus broader regime frameworks, such as policy initiatives and

¹⁸ Leadership in Energy and Environmental Design.

funding programmes, influence whether particular niche practices or technologies are adopted, and underline the need to analyse wider networks of support beyond the lone entrepreneur.

6. Conclusions – Green Entrepreneurs

Our research suggests that some green entrepreneurs *are* running businesses which aim to deliver both economic and environmental goods. These green entrepreneurs identify with the concept of nicheness, and suggests that niche status is something they value and seek to maintain. As mainstream businesses become greener, niche businesses move on to the next niche or innovative product in order to differentiate themselves from the mainstream. Socio-technical transitions theories are instructive for understanding the actions of these green entrepreneurs and helps situate their actions within the wider political and social context. Interviews with green building businesses have highlighted the complexities of government policy and wider frameworks of so-called support, and have raised some important issues about the ways that these green entrepreneurs interface with, and challenge, the extant socio-technical regime within which they operate.

Importantly, our research confirms that concentrating on the entrepreneur as a lone actor is a flawed approach; rather, more attention should be focused on exploring the support networks which encourage (or discourage) green entrepreneurs. This emphasis on wider networks and other actors is necessary to situate the actions of individual green entrepreneurs within their wider political and social context, and explore how green entrepreneurs are linked to other actors in facilitating sustainability transitions. Focusing solely on the individual green entrepreneur leads to a diminished theoretical understanding; concentrating on wider networks is imperative as without such supportive frameworks the scope for individual entrepreneurs to be influential and challenge regimes (i.e. beyond the niche) may be somewhat limited. Such a focus solely upon individual entrepreneurs can lead to an overstated relationship between green entrepreneurs and their potential to transform the economy, obfuscating the role of actors such as policy makers and funders, business support, informal support networks such as friends and family, and user practices. Indeed, we have found that in some instances such frameworks are less than supportive and even inhibit what can be achieved by placing restrictions and risk-adverse conditions onto projects. Thus, focusing on the wider social and political networks can illuminate areas for improvement if we are to enable a transition to a more sustainable economy expediently. One important lesson for the public policy agenda is that “niche elements which can be appropriated by the mainstream relatively easily...may form a first step towards mildly more sustainable reforms” (Smith, 2006: 455). The extent to which this occurs involves not just action by green entrepreneurs, but also state actions to ensure supportive institutional structures and forms are in place (Gibbs, 2002). Many of those working in transitions research are agreed that intervention in the pursuit of sustainability “is possible and potentially effective” (Walker and Shove, 2007: 219).

At the national scale, while encouraging the development of a green economy appears to be strongly embedded within the UK policy framework, there is some degree of uncertainty within this which affects green businesses. The research has coincided with the Conservative-Liberal Democrat government’s decision to reduce the funding through the Feed-in Tariff, and this is a particular issue which has concerned respondents, even for those not directly involved in solar installations. For these respondents, such changes are seen as indicative of a deeper lack of strategic direction and incoherence through U-turns leaving some feeling that the policy

framework is transient. Rodgers (2010) suggests that, with respect to policies, green issues themselves are becoming niche, relegated to specific departments within corporate business, and this is perhaps not surprising as it mimics the UK Government's own vision of "the green economy", as a bolt-on or freestanding part of the wider economy rather than a more holistic greening of all economic activity regardless of sector. Yet this counteracts broader messages from the UK government and their desire to be the "greenest government ever", leading to a further lack of clarity. Trends such as these were highlighted by our green entrepreneurs as being particularly disturbing. Uncertainty and lack of clarity is therefore a key issue for the future development of green entrepreneurial activity, despite claims that "the green economy" is where strongest economic growth will occur.

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