EMPOWERING PEOPLE TO LIVE LOW CARBON LIFESTYLES THROUGH NEW HOUSING DEVELOPMENTS IN THE UK

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**ABSTRACT.** The domestic sector accounts for around a quarter of UK carbon emissions. However, the home a person selects does not just affect their direct consumption of energy through the requirements for heating, hot water, lighting etc., but also affects other areas of consumption such as the embodied energy in the fabric of the building, personal travel, and energy used to supply the goods and services required to support our lifestyles. It thus makes sense that when we build new housing developments we consider how our design choices can support sustainable and low carbon living across all these areas of consumption. Current approaches to reducing carbon emissions through new housing are largely based on energy efficiency measures and renewable energy systems, and do not take account of the full range of emissions of the occupier which are directly or indirectly related to the way housing developments are designed and set up. Being able to draw on a wide range of technical and lifestyle options rather than energy efficiency and renewables only allows making low carbon living more affordable, boost the local economy and achieve a range of wider societal and ecological benefits.

However, if lifestyle measures are such a cost effective way of achieving carbon emission reduction the question is: why are they not more widely used? Whilst this is partly due to a lack of policy incentives, we were interested in investigated whether or not, without policy changes, there are new business models which could be directly applied and would deliver the adoption of low carbon lifestyles. Literature review shows that sustainable living can be fostered by empowering people who wish to live sustainably to make this choice. Focus group discussions were conducted with relevant experts to review possible business models which may enable more sustainable lifestyles through the way new housing is developed. Here, eco-self-build communities stuck out as new business model, which may foster the desired behavior change. The research shows that eco-self-build communities are both feasible as a social venture and have the ability to deliver low carbon lifestyles. In comparison to conventional approaches to building new housing, they also deliver additional social benefits and greater urban resilience. If implemented correctly they could succeed in making sustainable lifestyles attractive, and foster the development of pro- environmental social norms.

Keywords: low carbon, housing, sustainable lifestyles, behaviour change, urban development.

# INTRODUCTION

The Climate Change Act 2008 (OPSI, 2008) requires the UK to cut greenhouse gas emissions by 80% below 1990 levels by 2050. This is an ambitious target (DTI, 2007; Boardman, 2007; Hickman and Banister, 2007; Tight et al., 2005; Anderson et al, 2006; Audsley et al, 2009) and various studies have shown that this target cannot be reached with technical measures alone (Boardman, 2007; Hickman and Banister, 2007; Tight et al., 2005; Anderson et al, 2006; Audsley et al, 2009). Indeed, behavioural changes are required to go hand in hand with technological change (op cit.).

However current climate change policy targeting new homes is largely focused on technical measures only (Broer, 2012). Since 2002, Part L of the building regulations (ODPM, 2006) require high energy efficiency standards in all new homes in the UK. The Government intends to gradually further improve on these requirements to achieve a 25% emission reduction over Part L by 2010, 44% by 2013 and a final leap to “zero carbon” by 2016 (OPSI, 2008). A zero carbon home is defined as a home that produces no net CO2 emissions from energy used by the people living in the home (*i.e.*, to heat and light the home). This however does not include energy used in the construction of the dwelling, energy embodied in the construction materials, emissions from lifestyle” appliances such as TVs, computers and DVD players, energy embodied in goods consumed in the home, energy consumed in travelling to and from the home, or emissions from dealing with waste generated by the household. There are currently no specific national policies relating directly to new homes that limit, or require an assessment of carbon emissions from these other ways in which energy is consumed in the construction of or by future occupants of new dwellings (Broer, 2012).

Desai (2004) estimates the contribution of the energy used in a home built to 2002 Building Regulation specifications to the overall footprint of a UK resident using a consumer-based accounting methodology. He found that only 11 per cent of the carbon emissions generated by a typical UK resident living in a new home is created through direct energy use (heat and power) in the home itself. This raises the question as to whether there is anything that a house builder can do to encourage emission reduction in the other categories which amount to 89 per cent of emissions UK consumers are responsible for.

Whilst there is significant potential for energy and carbon savings through technological measures such as building insulation, use of high performance glazing, and efficient heating systems (Boardman, 2007), there is also significant potential for savings through behavioural and lifestyle changes (Janda, 2009) both within and outside the home. Many of these can be influenced by the design of dwellings and the developments within which they sit. For example, the location of a new housing development (in particular its proximity to services and facilities, including shops and public transport) can influence travel choices and thus the amount of energy used for travel, as can soft measures such as personal travel plans (Titheridge 2004). Some of measures can be incorporated into new housing developments through the land use planning system i.e. through transport and environmental assessments, and by applying certain planning conditions.

Previous research by Broer and Titheridge (2010a, 2010b) found that soft measures not usually required by the development control authorities or as part of the building regulations, could be more effective at reduction carbon emissions than the zero carbon homes approach advocated by the Government and would cost less. In addition, Broer and Titheridge (2010b) identified a number of wider sustainability benefits. Residents’ involvement in the design and construction of new housing has been identified as a possible opportunity to create such momentum (2010b). This may help create more sustainable developments—places where it is “cool to be green”, places which communicate that being green can be fun—thereby changing awareness and behaviour not only within the community itself, but which support a shift in social norms in the wider society.

New housing developments clearly provide an opportunity to affect behaviours, but how can these opportunities be realised given the current structure of the housing construction industry and current government regulations, policies and targets? Is there an alternative business model for new housing development which would encourage the adoption of sustainable lifestyles to a much greater extent than is currently the case, taking whole life consumption into account?

# THEORETICAL FRAMEWORK

Our literature review shows that both the way housing developments are set up and economic incentives (making it easy to live with a low carbon footprint) and a change in social norms and behaviour are required as pillars of a low carbon society (Collins et al., 2003; Jackson, 2005; Futerra, 2006). There is an opportunity in new housing developments to provide both (BRECSU, 2002; Desai, 2009). A greater change in behaviours and social norms may be achieved with a community approach (McKenzie-More, 2000; Barton, 2000; Taylor and Moghaddam, 1994). The current conventional way in which new housing developments are built in the UK are not normally supportive of such a community approach.

Further the physical design, community cohesion, the wellbeing of the community members and their ability and willingness to do something about a global problem such as climate change are intrinsically linked and can work in mutual support of each other (Broer, 2012, Gilchrist, 2000). This supports the hypothesis that a community approach towards delivering low carbon lifestyles in new housing is most effective if an overall sustainability approach including social, economic and environmental sustainability is taken.

A sustainable community is not only sustainable in itself but takes an active role in changing people’s attitude and behaviour within its own community and outside (Roseland, 2005; Seong-Kyu, 2007). This could be through leading by example, being a positive example of sustainable living, and through direct provision of information (Seong-Kyu, 2007). In order to do this the community needs to resemble a way of life, which others aspire too and seek (Jackson, 2008). This stresses the importance of finding solutions, which meet environmental as well as socioeconomic aspirations, rather than sacrificing one for the other.

To date, innovation in UK housing has been downplayed as a competitive strategy for the British speculative house building industry. Firms traditionally have focused on optimising their land holdings and timing the sale of dwellings to benefit from house price inflation (Ball, 1983; Bramley et al., 1995). Land acquisition and marketing skills have therefore been regarded as paramount (Ball, 1996; Bramley et al., 1995). New housing remains an essentially mass-designed and mass-produced product in the UK (Ball, 1996; Clarke and Wall, 1996). Many have argued that this approach has been detrimental to innovation in the industry and resulted in a low wage, unskilled workforce (Ball, 1996; Clarke and Wall, 1996). Such an industry already lame in technical innovation will also find it problematical to direct innovation towards facilitating sustainable behaviours. It is therefore important to understand if and how sustainable behaviours can be enabled within the current industry, and whether alternative business models can do the job.

One such alternative business model is self-build. Self-build is a mechanism by which residents can become more involved in the design and construction process. Self-build is the practice of creating an individual home for oneself through a variety of different methods. These can range from designing and building the whole house oneself through to simply managing the construction process or employing an architect to design and manage to construction of a personalized design. Jackson (2005) found that pro-environmental behaviour change requires a concerted study that integrated economic incentives with social norm change, which in their combination make it easy to behave more sustainably. This should be achieved through incentive structure and institutional rules which favour sustainable behaviour, combined with enabling access to the pro-environmental choice, and through engaging people in initiatives to help themselves and doing things differently. The self-build route meets a number of these aspects that drive pro-environmental behaviour: Compared to the alternative of buying an existing home, there are additional economic incentive for pro-environmental behaviour, there is access to a greater range of pro-environmental choices, and furthermore self-build in itself is an initiative to do things differently and can as such serve as an anchor for choosing new innovative and sustainable construction routes. To be more explicit, the economic incentive is that the self-builder gets the direct financial returns of any energy saving technology or energy efficiency measures chosen through reduced energy bills.  The self-builder is able to choose eco-friendly building material, construction methods and appliances which are already in place for someone buying a home.  As self-builders need to choose their construction materials, insulation and appliances anyway to have somewhere to live, it is a much simpler step to then also explore the eco-friendly option that if they were already in a house which they could upgrade or not.  Indeed the UK Housing Strategy (CLG, 2011) as well as NASBA (2008) state explicitly that self-build promotes environmental sustainability and drives innovation in building technique.

In the UK the demand for self-build homes exceeds its supply (NASBA, 2008). In addition there is increasing demand for sustainable homes and communities (Ipsos Mori, 2007) and innovative and sustainable technology, for example high levels of insulation, timber frame, solar energy, underfloor heating, and ventilation systems are particularly favoured amongst many self-builders (Ipsos Mori, 2007). Furthermore building homes as part of a community may have a number of advantages and additional opportunities such as communal infrastructure and renewable energy systems, communal recycling facilities, a shared garden, bulk purchase of construction materials and sharing skills and advice during construction with each other.

Thus it seems, when it comes to new housing developments, there are two dimensions to encouraging behaviour change and enabling low-carbon housing to be built. On one axis is the extent to which the future occupiers of the building are involved in its design and construction and on the other is the extent to which the development fosters communities. Figure 1 shows some examples of business models for housing construction that illustrate the interaction of these two dimensions.

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Figure 1: Examples of business models that reflect different levels of community features and differing levels of involvement of residents in the design process.

# METHODOLOGY

A focus group was conducted to explore who then set out to brainstorm potential new housing business opportunities for driving low carbon lifestyles and involving the local community and future residents to do so, based on the framework presented above. The focus group brainstorming session, conducted with six relevant staff members at the sponsoring company Camco, set to work to identify, to compare and to evaluate alternative business models for delivering sustainable communities in the UK.

From the results of the focus group a single business model was identified with the greatest potential for enabling low-carbon living. This model was then explored further to identify market potential, scalability of the concept and barriers to wide-spread implementation. To do this a number of interviews were conducted with different stakeholder groups. These groups included: potential purchasers (including some interested in self-build and some definitely not interested in self-build), conventional and “green” house builders, land agents, entrepreneurs, financiers and representatives from planning authorities. Three representatives from each stakeholder group were interviewed. The exceptions to this are two groups, which were judged to be of greater importance: representatives from an eco-self-build community at Ashley Vale in Bristol (see box in Section 8.2), UK and potential customers. In these cases, 10 representatives were interviewed for each group. The interviews took place between 2007 and 2009. More detail about this methodology is provided in Broer and Titheridge (2010b) and Broer (2012).

# RESULTS

## The environmental, social and economic benefits of the different business models

Table 1 summarises the discussion from the focus group on environmental (including carbon), social and economic sustainability benefits of each of the four business models identified. Whilst these overlap, dividing sustainability into the three categories seemed to the group to be the most sensible way to structure the discussion. Because the task was about identifying potential business models to enable sustainable communities, it was also decided that the discussion should start with the sustainability parameters and then as a second step cover the financial feasibility side (specifically on carbon savings that could be enabled). Ideas and concepts arose on a general basis; these were then discussed in specific detail.

TABLE 1. Business models identified and their ability to deliver sustainable communities

|  |  |  |  |
| --- | --- | --- | --- |
| **Business model** | **Social sustainability** | **Economic sustainability** | **Environmental sustainability** |
| Conventional UK housing with added sustainability features (e.g., high code for sustainable homes rating). | Little community empowerment.  Common sustainability theme may bring community together. | Carbon emission reductions are achieved at high cost to the economy. | Carbon footprint of the home itself would be reduced up to zero.  Difficult to change lifestyles. |
| Co-housing with environmental features (private homes with shared communal facilities and activities, e.g., shared kitchen and dining area and communal dinners three times a week). | Social sustainability and empowerment enabled through providing many opportunities for community members to interact and contribute to their community, for example, through cooking a meal. | Shared facilities can be more cost effective use of services and buildings.  Community interaction fuelled through the co-housing approach supports exchanges of skills and services and use of local reliable workforce and services. | Shared facilities are also less resource-intensive. Shared means make it easier and cheaper to purchase ethical produce in bulk.  Co-housing communities can be themed around sustainability and this can be easily cultivated through the many community features of the scheme. |
| Eco-self-build individual homes (Privately owned homes that are designed and built by their future owners). | Individual self-build homes help empower the individual to take action to improve their livelihood.  They do, however, have little effect on the surrounding community. | Self-builders are likely to employ individual and small enterprises rather than big companies, thereby supporting SMEs and the local economy and often achieving lower costs on the build.  The profit from the home stays with the individual rather than a large property company, facilitating further spending on sustainability measures. | Environmentally minded self-builders are able to choose novel eco-friendly building materials and technology. This choice is not normally available when purchasing a home outright where house builders tend to choose technology largely driven by cost only.  Self-builders directly profit from energy efficiency measures because their bills are reduced. Therefore, they are likely to be more willing to pay the extra capital costs. |
| Eco-self-build communities (groups of self-builders who come together to each build their own homes and their community together). | Eco-self-build communities can empower people not only to build their own homes, but to build their own communities.  Social interaction is enhanced by group activity, and inviting people to choose community features they would incorporate into the community design. | In addition to the advantages of individual self-builds, costs are further reduced through bulk purchase, sharing management responsibility (e.g., price negotiation and researching building materials), and recommending contractors to each other.  The scale of the scheme allows for training site staff in eco-construction thereby creating employment and building up a new qualified workforce in the field of sustainable construction. | Eco-self-builders can share each other’s tools and building materials. One self-builder may use the off-cuts of another one, thereby minimising waste.  By allowing everyone to feed into the design from the start, opportunities open up to customise mixed-use development (work, community and living space on the same site), thereby reducing emissions from commuting, and maximising uptake of benefits. |

Based on Table 1 and further discourse, the group exchanged views on the financial viability, carbon savings potential, and wider sustainability potential; and, on joint consensus, evaluated each category. The overall judgements are presented in Table 2 and the outcome of the discussion is described in detail below.

The dialogue revolved around the possibility of adding sustainability features (e.g., community features, low carbon technology, awareness-raising activity) to conventional housing developments. Group members had significant experience in this area and aimed to do so with progressive and less progressive developers. It was thought among participants that, while there was room for improvement of conventional developments and a proportion of house builders would be willing to go beyond legal requirements, really significant shifts in UK house building had never occurred. Developers would commit to extra sustainability activity on the assumption that this would improve their planning negotiations with local authorities. Therefore, behaviour shift activity towards sustainable developments after gaining planning permission would be less likely. The group saw a small window of opportunity for smaller commercial house builders and social housing providers that do not put profit targets foremost. However, small house builder and social housing providers’ activity is limited because they need to obtain bank loans. Although their focus on profits may be a lower priority, they are duty-bound to loan repayments and financing restrictions. But this option was regarded by the majority of participants as a realistic opportunity to improve on housing development.

A second opportunity was seen in Co-housing. Often described as "the old-fashioned community of the future," co-housing aims to provide residents with a balance between personal privacy and living amidst people who know and care about each other. This small-scale, mainstream, neighbourhood design overcomes the alienation of modern housing complexes where knowing one’s neighbours is rare and there is little sense of community. Co-housing is characterised by private home ownership plus shared communal facilities. Private dwellings cluster around a "Common House" which may include a dining room, play rooms, workshops, sitting areas, or library. Residents of co-housing communities often have several optional community-wide meals in the Common House each week prepared on a volunteer basis by the residents themselves.

Co-housing neighbourhoods range in size from as few as eight households to as many as 50. Co-housing communities follow no ideology. Indeed, attracting a wide range of people of different ages and professions is the co-housing developments’ modus operandi (The Ecohousing Corporation, 2009).

The group judged that co-housing provides a very good opportunity to involve the community, as people who join co-housing schemes already seek community. Co-housing features may also provide reduced resource and energy consumption through sharing facilities. However, the panel was uncertain about the popularity of co-housing and regard it as a small niche market. One member had specifically investigated co-housing and remarked that it was not currently something many people were actively looking for.

The group then proceeded to deliberate the opportunity for self-build. Self-build is the practice of creating an individual home for oneself through a variety of methods. People build individual homes mainly because: they want to create something tailored to their family's unique requirements; or something architecturally appealing in all manner of styles; or because they want to live in a home they might not be able to afford on the open market. Very few self-builders in the UK actually build their homes entirely by themselves. The majority employ an architect to sketch the design and then contract a builder to construct it; others use so-called 'package' companies to provide a one-stop solution. Many others manage building sites and deal directly with planners, trades people and materials suppliers. There are also so-called “semi-self-builders” who purchase homes that are completed on the outside, but they complete the inside: electrics, plumbing, internal walls, and layouts, painting and decorating themselves based on their personal preferences (NaSBA, 2008).

Judging from the popular literature about it and from personal experience of one participant, in the UK there is a high demand for self-build homes and a significant share of self-builders are interested in sustainable and eco-friendly homes. Currently, the UK self-build market is composed of individuals who build their homes on a plot they have purchased. The group only knew of one example of a group who had collectively undertaken an eco-self-build community scheme. Thus it was decided to assess the opportunity for two separate self-build categories: individual eco self-build homes and eco self-build communities.

In contrast to property developers, self-builders make decisions regarding their homes based on personal preferences and values. They neither need to report to a company nor are they under pressure to meet profit targets. If they have adequate finances, they can make pro-environmental choices based on personal belief. Decisions made when building a house can also pay-off over the long-term, for example, energy efficiency or water saving measures. A self-build house builder is more likely to include and pay for such measures as the person who will benefits from them is both the resident and the house builder.

The group conferred about how self-builders can design their houses to their exact specifications to meet their personal needs and use resources more effectively. In a community scheme, where the whole community infrastructure and set-up could be designed to meet the needs of a group and adhere to community formation and behaviour change, this idea could advance further than for individual self-builds. By default, the self-build process and need for communal decision-making would support the formation of a close-knit community even before people moved into their homes. Sustainable and low carbon lifestyle values could become integral to the community where members take pride in what they have created and established for the wider benefit of the community and the planet as a whole. The social capital of future residents could be harnessed through their involvement in the design and construction of their homes and community, and if desirable places could be created this way, they may promote sustainable behaviour and shift social norms in the wider world as a spill-over effect. Participants mentioned terms such as – “create beautiful communities where it is cool to be green”, “places which communicate that being green can be fun” - thereby changing awareness and behaviour not only within the community itself, but which support a shift in social norms in the wider society.

The group saw great potential in this approach, but wondered why even though there was high demand for self-build in the UK, they were only aware of one community scheme: The Ashley Vale Site in Bristol. They speculated on the barriers, but the group decided that they knew too little about these aspects to give a valid judgment. The group concluded that the eco self-build community may be a promising route for enabling low carbon lifestyles and wider sustainability and community benefits and thus warrants further investigation. This seemed to be the only (and most promising) outcome with the potential to significantly reduce carbon emissions in new housing developments.

TABLE 2. Overall rating of the business models on carbon, financial viability potential and other sustainability benefits

|  |  |  |  |
| --- | --- | --- | --- |
| **Business model** | **Likely ability to be financially viable** | **Carbon savings potential** | **Wider sustainability benefits** |
| Conventional UK housing with added sustainability features | Currently very few developers go further, although no change in business model is required.  Only one development Bedzed has demonstrated significant progress. Bedzed was not financially viable.  Judgement: LOW | Within the financial viability range carbon savings are limited.  Judgement: LOW | No significant change foreseeable from current status quo. Value-driven property developers may be able to make a difference.  Judgement: LOW to MEDIUM |
| Co-housing with environmental features | Uncertainty about demand for co-housing in the UK. Could be a very small niche market.  Judgement: LOW | Carbon savings through shared resources and community activity.  Judgement: MEDIUM to HIGH | Significant social benefit.  Judgement: HIGH |
| Eco-self-build individual homes | High demand for self-build in the UK.  Judgement: HIGH | Savings as people build want the want/need, and can make choices they directly benefit from themselves (e.g., energy efficiency measures)  Judgement: MEDIUM | May support local economy and environment.  Judgement: MEDIUM |
| Eco-self-build communities | High demand and willingness to pay. However uncertainty about how easy it is to implement because there is currently only one scheme, hence no existing industry.  Judgement: UNCERTAIN to HIGH. Worth further investigation to identify current barriers and potential solutions. | Both savings from meeting the exact needs and being able to innovate, and from shared resources and community activity. Community spirit can enhance a shared vision and activities related to creating low carbon futures together.  Judgement: HIGH | Significant social benefits may support local economy and wider environmental issues.  Judgement: HIGH |

The co-housing and eco-self-build community proposition shows significant opportunities for delivering social, economic and environmental sustainability, over and above what a conventional development with sustainability features may achieve. The eco-self-build community proposition could incorporate community and co-housing features. It was highlighted as a possible business opportunity due to the increasing and unmet demand for self-build opportunities.

## The potential for and barriers to community-based eco-self-build

In general the interview analysis confirmed that there is demand for eco-self-build communities. Only one person interviewed stated that they would not want to live like this and another two clearly did not have the funds or know how to do so. Some of the people from the Ashley Vale site (the only example of community-self-build in the UK at the time the interviews were being conducted) made reference to the number of people asking them how to get involved in a similar scheme. A large proportion (18 out of 20) of the potential customers and self-builders interviewed said that they would prefer to build as part of a community scheme rather than on their own.

The interview analysis showed that the main barrier is the difficulty of a community to buy the land. In the UK, when public land is disposed of significant expertise and capital outlay is required when bidding for the land (Inteviewees 29, 37 and 38). By en-large only large construction businesses have such funding available to them that they can spend at risk before even knowing whether they will win the bid. Groups of individual self-builders however would not normally have the funds available (Interviewees 2, 4, 5, 12, 14,and 15) and banks won’t lend at this stage (Interviewees 25, 26 and 27). Likewise when land is disposed of privately, a group of self-builders who each need to get an individual mortgage is up against a single property developer. The group will need more time for the purchasing process and estate agents and developers are likely to prefer to do a single transaction than something they have not been used to and may be more risky (Interviewees 34, 35 and 36). Other major barriers are financing, people management, and planning permission (Broer and Titheridge, 2010b; Broer 2012).

However, by doing it themselves, self-builders can build more cheaply (Interviewees 11 to 21). And because property developers typically have a property developers have profit margins of 20% or more (Interviewees 28, 29 and 30), this mean that even if self-builders pay a bit more for the land they will still get much better value for their money, not just because they can customize the design of their homes and communities to their personal preferences, but also because they keep the developers profit margin.

# DISCUSSION

Conventional business models for new housing development, operating under current government regulations, policies and targets have failed to develop housing which encourages the adoption of sustainable lifestyles taking whole life consumption into account. An alternative business model of eco-self-build communities is proposed as a way to foster desired behaviour change. The perceived feasibility of eco-self-build communities in the UK was explored through literature review and interviews with stakeholders including existing and potential customers, financiers, competitors, laggards, landowners, local government, and self-build lobby organizations.

Our literature review shows that there is both demand for sustainable homes (Ipsos Mori, 2006; Knight and Frank, 2007; Cabe, Halifax and WWF, 2004) and also significant demand for self build homes (NASBA, 2008; Barlow et al, 2000; NPBS, 2004). We estimate the market demand in the UK for sustainable homes and self-build homes to amount to 20% and 38% of all now homes build respectively (Broer and Titheridge, 2010b). This translates into an addressable market of £5.5 billion for building plots and £7.2 billion for completed homes, or 64,000 plots and 33,000 homes per year.

Whilst there is significant demand this demand is however currently not be met by an industry largely consisting of volume house builders and small-scale builders (Barlow, 1999). Whilst our analysis of literature and survey results shows that eco-self-build-communities outperform conventional new build housing in 18 out of 22 categories listed by Ipsos Mori (2006) to be the main home buyers priorities, there are significant barriers in place in the UK that stop such developments from happening (Broer and Titheridge, 2010b).

Analysing the interview scripts we developed a business model for an enterprise, which enables eco-self-build communities. The detailed analyses is described and discussed in Broer and Titheridge (2010b) and the final business model is described here. The factors judged most critical to success resulting from interview analysis are the selection of customers based on their social capital, child friendly design, the land deal and deal structure, community provision, support to self-builders, and cultivation of a shared purpose.

The research shows that eco-self-build communities are both perceived to be feasible and have the ability to deliver low carbon lifestyles. In comparison to conventional approaches to building new housing, they have further advantages in terms of delivering wider social, environmental as well as economic sustainability objectives. If implemented correctly they could succeed in making sustainable lifestyles attractive, and foster the development of pro- environmental social norms. Policy support is required if they are to make a significant contribution to UK carbon emission reductions and become more widespread in the UK

# POLICY RECOMMENDATIONS

The UK Government needs to consider how to encourage developers to take a more holistic view and reward them for implementing lifestyle and behaviour carbon saving measures. New regulations and mechanisms for delivering sustainable low carbon homes beyond building regulation, the Code for Sustainable Homes (CSH) and the current planning system may also need to be investigated.

Potential opportunities are:

• Land requirements: Land could be set aside specifically for these types of development within the Land Development Framework. An alternative would be to specify that in each local authority a percentage of land identified for housing developments should be for self-builds which meet a high level of sustainable low carbon living and behaviour change parameters.

• The removal of planning barriers to eco self-build communities. This may include the encouragement of local planning authorities to prioritise and provide support for eco-self-build development in their local plans.

• When local authorities and public organisations such as the Homes and Communities Agency sell their land, they could include credits for “sustainable lifestyle measures” in their best value bidding process. In addition the bidding process needs to be reviewed and modified to make it possible for community groups to take part and stand a realistic change of winning the bid.

• In a similar way that the Government requires and encourages house builders to meet minimum carbon targets for direct home energy consumption through Part L and the Code for Sustainable Homes, minimum standards could be set for other carbon intensive categories effected by new housing, Especially for building materials and transport such an assessment could be relatively straight forward: Using material quantities the carbon footprint of the building materials can be calculated. Transport assessments are already required for many developments, and tend to include increase in motorised transport journeys and distances per mode of travel caused by the development, and may include options to reduce travel activity (DFT, 2007; DETR, 2001). The resulting carbon implication could easily be calculated using government data on carbon footprint per mode per distance travelled.

In addition to these direct incentives for enabling low carbon lifestyles in new UK housing development, UK climate change policy may benefit from a greater focus on sustainable behaviours. Policies such as carbon taxation or consumer carbon rations and would support sustainable behaviour choices not only in new housing developments, but in all emission categories to which they are applied. Such financial instruments provide the same financial reward for emission reductions achieved through behaviour change as through technical solutions, and therefore by default put technical and behavioural change on a level playing field. Thus they are more likely to lead to the implementation of the most cost effective ways of reducing emissions.

# CONCLUSIONS

The UK’s 80% carbon emission reduction target can only be achieved if both technological and behavioural changes are implemented. New housing presents an opportunity for such technology and behavioural change because many design and set up decisions can be made which can make low carbon lifestyle choice easier. We here looked specifically at solutions that property developers and residents of new homes can choose to implement.

Behavioural change requires economic incentives and/or a change in social norms. To maximise change and be capable of meeting the 80% target, both are needed. Communities affect social norms, therefore, if we can instigate value-driven communities in new housing developments that are strongly aware of climate change, there will be a greater chance to influence individuals’ behaviour. A focus group based innovation workshop was held in order to identify business models for new UK housing, which may deliver such responsible communities. In the workshop eco-self-build communities were perceived as a potentially promising opportunity. Furthermore, it was realised that a low carbon approach could work in mutual support of an overall sustainability approach.

The perceived feasibility of eco-self-build communities in the UK was explored through literature review and interviews with stakeholders including existing and potential customers, financiers, competitors, laggards, landowners, local government, and self-build lobby organisations. The main barriers to eco-self-build communities were judged to be: land acquisition, financing, people management, and planning permission. The factors judged most critical to success resulting from these desirable features and barriers are the selection of customers based on their social capital, child friendly design, the land deal and deal structure, community provision, support to self-builders, and cultivation of a shared purpose.

In order to be able to achieve the Government’s 80% carbon emission reduction target many opportunities, which enable and encourage low carbon lifestyles will need to be realised. Eco self-build communities have been shown to be one of these opportunities.

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