



A literature review for the EVALOC project

Individual and Social influences on Energy Use

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Abstract

EVALOC has been set up to evaluate the impacts of low-carbon community groups on individual, household and community energy use¹. The review explores some of the key internal, community and external level influences on household and community energy use and interactions between them. It discusses the role community groups can play in addressing some of these influences, in relation to a range of other actors, and identifies a number of relevant change theories and strategies that they can draw on. Initial evidence in the literature suggests that at local level community groups may be well placed to: develop niche innovations; motivate and empower local people; change energy behaviours; encourage people to adopt energy efficiency and low carbon technologies; and influence social norms. Less well researched is their potential to contribute to systemic change, for example by diffusing innovations, informing and shaping policy and/or building a majority movement for change. Despite these contributions the voluntary nature, and uneven spread, capacity and reach of community groups, suggests that at local level they are best seen as a complement to action by local authorities and other agencies. The range of external/ structural influences on energy use identified by the review highlights the important role of a strong, equitable and predictable policy framework and financial incentive structure in driving change. The EVALOC research project will explore and test some of these issues.

Individual and social influences on energy use: a review for the EVALOC project

1. Introduction

EVALOC is interested in understanding the role of community groups in reducing household and community energy use.² The primary purpose of this review is to guide the research and secondarily to inform communities about the research literature. The review is divided into three main sections. First a brief overview of some key issues; second, an assessment of some of the key internal and external level influences on energy demand including, where relevant, a discussion of community level influences; and third, a discussion of various change strategies relevant to low carbon community

¹ EVALOC is a collaboration between Oxford Brookes University, Oxford University and six (DECC funded) low carbon communities. It draws together an interdisciplinary team of researchers to assess the impacts of the Low Carbon Communities (LCCs) on individual and community behaviours and energy use, and the communities' success in achieving sustained and systemic change. The project also seeks to explore the role played by social learning, energy feedback devices, social networks and knowledge transfer in achieving these changes. See <http://www.evaloc.org.uk/> supported by the Economic and Social Research Council (**Grant reference: RES-628-25-0012**). Any views expressed are those of the authors alone and do not necessarily represent the views of the funders.

² By community energy use we mean aggregated energy use in a specific geographical area which would include energy use by households, businesses, other buildings, and services.

groups (LCCs). We tabulate some of the implications for the design of community carbon reduction interventions in Annex 1, and provide examples of behaviour models in Annex 2. Other reviews will examine the literature on community energy initiatives, social networks, energy and carbon monitoring and measurement tools; social networks; and local governance issues.

2. Overview of key issues

An assessment of communities' role in changing energy behaviours and reducing energy use needs to be located in a wider discussion about the transition to a low carbon future including: *what* needs to change –which entails identifying and prioritizing the most important areas of energy use, and the key influences on them, and setting clear change objectives to address them; *who* is responsible for guiding and implementing carbon mitigation interventions - which entails clarifying the duties, responsibilities and capabilities of different actors; and *how* to achieve change – which entails identifying, prioritizing and coordinating a strategic mix and sequencing of mutually reinforcing change interventions.

In relation to *what* needs to change, a case can be made from the literature that the key change objectives should include: (a) increasing energy efficiency of infrastructures, buildings, appliances and vehicles; (b) reducing energy demand - both direct demand for electricity, gas, oil, petrol or other fuel, and indirect demand via the consumption of products and services; and (c) de-carbonising energy supply – from both centralized and distributed sources, including micro generation (Whitmarsh, 2011; Willis and Eyre, 2011). There is disagreement about the relative importance and feasibility of achieving these different objectives, but the current uncertainties about the cost and time scales of the various supply side solutions suggest that all three strands are necessary, an approach that the UK Low Carbon Transition Strategy has adopted. There is also increasing recognition that getting people to adopt and use the technologies in the first place, and doing this in a way that maximises energy savings, will also require changes to people's energy behaviours.³ For example, one study suggests that approximately half of the energy used in the home depends on the physical characteristics of a house and its equipment, with residents' behaviour accounting for the rest (Schipper et al., 1989).

There is a mass of literature, and a range of different theories and models, that seek to identify the various influences on energy behaviours and use which we can group as follows:

- '*Internal*' individual influences - related to what goes on inside a person's mind - such as knowledge and patterns of thinking; values, beliefs and attitudes and intentions; personal agency (a person's belief that they can take meaningful action); perceptions of social norms; routines & behaviours.

³ Even a new centralised generation and supply infrastructure will require public support and some behaviour change, because of the shift to electrification of heating and transport and likely changes to pricing structures. There is also evidence that the energy and carbon energy savings from renewable and energy efficient technologies are maximised when accompanied by behavioural advice (Janda, 2009).

- *Community/group level influences* - related to what goes on within groups, social networks and/or geographical communities - such as group capacity; and group norms and standards.
- *External (or structural) influences (at local and national level)* - i.e factors beyond the (short term) control of individuals and communities - such as economic influences (income levels, relative prices); availability of and access to low carbon technologies, infrastructures, goods and services (at household and community level); social structures (including social practices, institutional practices; socio-economic conditions; cultural values; power relations); public policy (including information, financial incentives and regulation).

These models act as useful guides to help policy makers and practitioners identify the key influences on energy use, and to guide action. But they should not be used as blueprints, as the influences on energy use, and relevant change strategies, are likely to vary according to the specific energy behaviour, individual and context.

In terms of *who* is responsible for guiding and implementing carbon mitigation, in principle the main duty bearers are governments which are obliged under various international agreements and national legislation to protect the environment and human rights, and reduce carbon emissions. However, in practice, over recent decades, the policies and processes of privatization, sub-contracting, and decentralization, are widely understood to have shifted governments' role (national and local) from one of implementation to steering other actors. Discussion in the energy and behaviour literature has consequently tended to focus on the role of government in enabling other actors to take action (Thaler and Sunstein, 2008) and/or nurturing niche innovations (Geels, 2007). This perspective is complemented by a view that the transition to a low carbon future will not be secured by government acting alone (e.g Eyre, N. 2013) but will need to be undertaken by a range of actors at different levels and in different sectors including government, local authorities, communities, business, building professionals, and households (e.g Parag and Darby, 2008; Parag and Janda, 2010).

Some voices have, however, emphasized that transformational change will need for governments to use a wider range of market transformation policies (eg Fawcett and Boardman, 2009; DEFRA 2008, House of Lords, 2011) and to play a stronger role in making change happen including through direct provision of public goods (Nordhaus T. and Shellenberger M. 2001). There is also an argument in the wider literature that governments still have unrivalled authority and capacity to achieve change, if they so choose (Hay, 2006) whether through fiscal means, regulation and/or the provision of public goods.

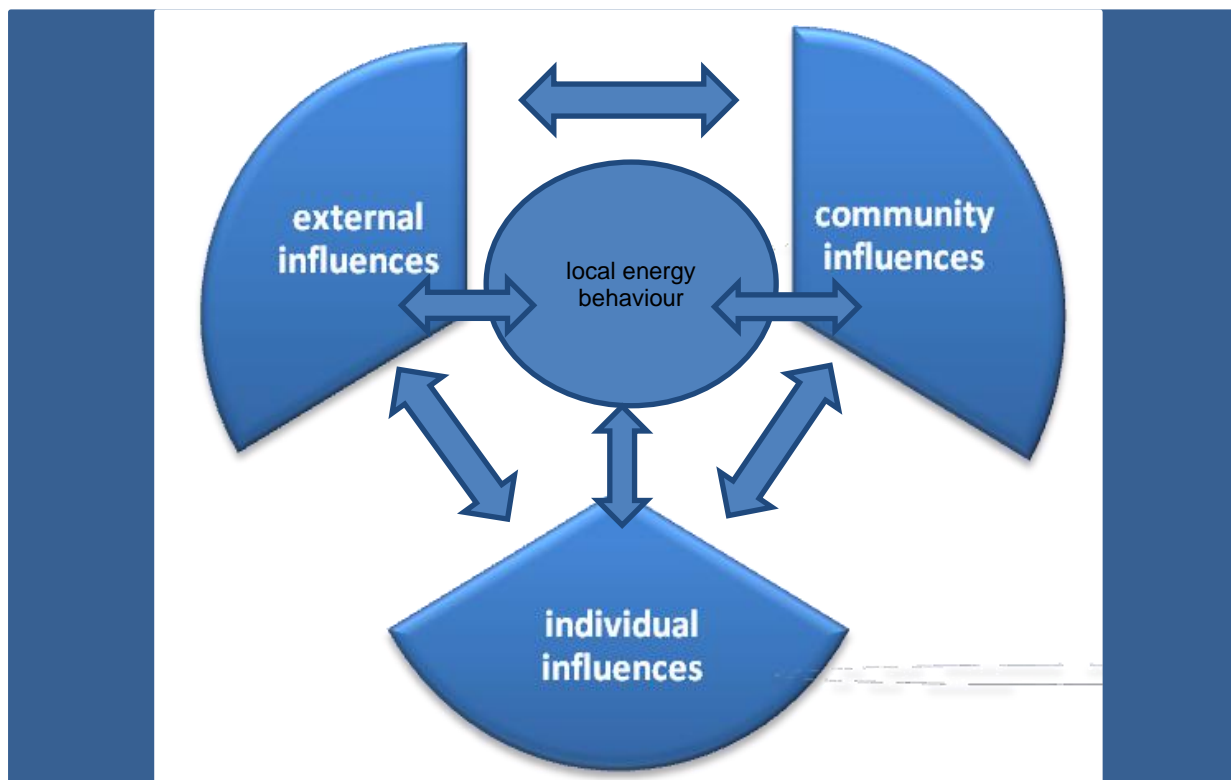
Equity considerations are also important in determining responsibility for climate change mitigation. Discussion in the UK has mainly focused on fuel poverty but recently been broadened to consider roles of other actors (Mayne and Buell, 2012; Bulkeley and Fuller, 2012). As this is a community-focused project, and we are particularly interested in change at the neighbourhood level, we mainly focus on the role communities can play in achieving change at local level, but also briefly explore their contribution to wider systemic change.

In relation to *how* to achieve change, as well as identifying the key influences (enablers or constraints) on energy behaviours and use, some theories seek to understand the process of change. For example, individualist theories see social or systemic change

occurring as the result of the collective outcome of individual decisions whereas sociological and political theories stress that social change is linked to pressures from external/structural influences. However, the direction of change, and the relationships between different influences, is not necessarily as straightforward as sometimes assumed. While it is commonly assumed that knowledge and beliefs lead to actions, many other internal and external influences can intervene in this relationship (Blake, 1999). Moreover, the direction of change may be reversed, with changes in behaviour subsequently shaping attitudes or beliefs (Prendergast, 2008; Jackson, 2005). A leading example in another sector is the London congestion charge. Many of the public were opposed to the charge before it was introduced, but attitudes became more favourable afterwards. Similarly, legislation introducing compulsory wearing of seat belts and banning drink-driving came in advance of widespread public support (Dorfman et al., 2002). Similarly at local level, changes to council rules and introduction of arrangements for recycling sometimes initially create opposition initially, but eventually contribute to positive changes in attitudes and practices. This suggests that tackling behaviours or energy use directly, rather than seeking address the multiple influences on it, may sometimes be the most effective strategy.

A number of theories suggest that rather than being a linear process, change comes about through the *interactions* between different (groups of) influences. In the literature on socio-technical systems, for example, there is an increasing focus on understanding the interaction between the physical/technological aspects of the house and occupant behaviours (Janda, 2009). And practice theory – a form of cultural theory – focuses on the interactions between individual, cultural, and social influences on energy use (Spaargaren and Van Vliet, 2000). It argues that people are carriers of social practices – i.e. particular ways of understanding, knowing and acting in the world – which exist independently of individuals. Thus people often do not consciously use energy but rather carry out a range of practices – such as washing, cooking, showering – which happen to use energy (2000; Shove, 2003). Transition theory has made an important contribution by helping conceptualise how change can occur through the interactions between different levels in a system – landscape, regime and niche innovations (e.g. Geels and Schot, 2007).

In EVALOC, our focus is on the interactions between the community group, and the various internal, group and external/structural influences on local energy behaviours and use (see diagram below), as well as the interactions between occupants and the physical fabric of their homes. We use the term *energy (related) behaviours* to include the purchase, use, maintenance or lease of energy-using appliances, technologies, goods or services. We recognize that these behaviours are often at least partly social in nature, as when we heat our homes, dress, and travel in ways that are expected by our friends, colleagues and neighbours, and that people are often unconscious of the energy use or carbon footprint which they entail. (NB The material in this review relates to influences on *direct* energy use in households and communities, rather than indirect energy use related to food, waste, transport, and/or other services)



However, achieving change also requires purposive change strategies tailored to different sectors, and levels and actors, and types of energy behaviour and use. Changing habitual behaviours, for example, requires different types, scale and time frames of interventions than changing infrastructure, policy and social practices. As EVALOC is primarily interested in the role of community groups, we focus on the following change processes and strategies that are relevant to their efforts to change local energy behaviours and reduce local energy use:

- *Changing energy behaviours and practices* –to influence habits, social norms, cultural values, and energy related behaviours.
- *Strengthening agency and capacity* - to motivate and empower people to change energy related behaviours.
- *Innovation and diffusion* – to increase the uptake of energy efficiency and micro-generation technologies.
- *Changing policy* – to change the rules, incentives and service/provision that shape energy behaviours and use (e.g relating to behaviours, technologies, goods, services, infrastructures, social structures etc).
- *Changing cultural values*– to influence the shared values and collective conventions that shape energy behaviours.

Where possible, we have included businesses, public buildings and transport, recognising that all of these are important elements of communities, and that experiences in the home may affect behaviour in other areas, and vice versa. We have inevitably simplified some findings and omitted others, but attempt to express some of the key themes in the literature, including complexities that arise when energy systems are also social systems.

3. 'Internal' influences on domestic energy use

A large strand of the literature on energy and behaviour focuses on internal factors (that is, factors that begin with, or are part of, a person's thinking) such as attitudes, intentions, cognitive capacity, moral values, emotional and affective factors, habits and personal norms, and sense of agency or efficacy. We first look at two broad theories or approaches to understanding the internal influences on human behaviour – rational choice theory and socio-psychological approaches. We then take a more detailed look at what we consider to be some of the key non-rational internal influences on energy behaviours and use, to help us construct a useful framework for developing our own research into the workings of low-carbon communities.

3.1 Energy users as a rational-economic people influenced by price, income, and product characteristics

'Rational choice theory' has exerted a dominant influence on our understanding of behaviour and over policy making over much of the past century. It is underpinned by the assumptions that consumer preferences and behaviours are based on (a) rational decision making (b) subjective preferences (c) self-interest aimed at maximising personal utility (Darnton, 2008; Jackson, 2011). The theory thus assumes that behaviour is determined by people deliberately and rationally weighing up the costs and benefits of different actions and deciding on the actions that maximise their 'subjective utility' or satisfaction.⁴ Their decisions are assumed to be based on the internal factors affecting people's beliefs or expectations about a product, service or course of action, and their evaluation of the likely outcomes of the choice.⁵

The theories of consumer preference (Samuelson, 1938 and Begg et al., 2003, quoted in Jackson, 2011) assume that consumers maximize their expected utility based on: the relative *price* of goods (including substitutes); their available *income*; their *preferences*; and the *products' characteristics* (Lancaster, 1966). As price, income, and product characteristics are determined by others, we examine their influence on energy use in the section on 'External Influences'. The role of preferences is examined in both sections.

A key implication of rational choice and consumer preference models is that you can promote pro-environmental behaviours by providing people with the right information, financial incentives, and product designs. These factors do play an important role. One of the most successful developments in recent years, for example, has been the introduction of market transformation policy in the EU which involves a comprehensive approach to product standards, labelling, marketing and procurement (Boardman, 2004). The important role that financial incentives can play is also evident in the rapid uptake of micro-generation technologies as a result of the introduction of the Feed in Tariff (DECC, 2012). However, rational choice theory defines the individual narrowly (as a consumer), without taking into account other [social] aspects of being human (Devine Wright and Devine Wright, 2005). Nor does it investigate the origins, nature, or validity of people's preferences (why we want what we want) or how they develop or evolve

⁴ In standard economics, utility is often defined in terms of consumption choices.

⁵ This feature of the model often leads to rational choice models being referred to as expectancy-value models.

over time (Jackson, 2011), and it has little to say about habitual energy-using behaviours. This approach is therefore most likely to be most useful in situations where a specific, simple response is wanted, but even then it may need to be accompanied by other complementary interventions.

While community groups have little influence over people's incomes, or product prices and characteristics, they may be well placed to help simplify information, highlight particular choices, and influence people's preferences by creating new social norms through group-based energy conservation projects.

3.2 Energy users as social animals, influenced by values, social norms and agency

Research in social psychology has shown that in contrast to some of the core assumptions underpinning rational choice theory, domestic consumers do not always act primarily as rational profit maximisers, the role of price is often weak, and socio-psychological factors such as social norms may be important predictors of behaviour. (Eyre, 1997). Behavioural economics has attempted to bridge the gap between neoclassical economics and psychology in that it assumes that individual behaviour can still be driven by incentives, but is not necessarily rational.

An important implication of these understandings is that unless 'non-rational' influences on energy use are addressed, people may not just maintain but increase their energy consumption, even in the face of economic disincentives (Whitmarsh, 2011). We look first at some of the 'internal' individual socio-psychological influences below and related models, and then assess some of the 'external' sociological influences in the next section.

Community groups are thought to be well placed to influence some of these non-rational influences as, for example, they are known and trusted by residents, and are more familiar with the factors that shape energy behaviours (Bunt, L. 2011, Cox, J. et al, 2010).

Cognitive capabilities. One of the challenges to rational choice theory stems from the observation that people's ability to process information – their cognitive ability – is in practice 'bounded' or limited. That is, individuals often do not have the information, cognitive ability or time to make rational decisions. In practice, they often use a variety of heuristics, or rules of thumb particularly when information is complex or where there is uncertainty (Simon, 1957). Their decisions are not always fully rational. For example, there is evidence that people tend to underestimate the importance of future compared to short term gains which makes the promotion of long term worthy causes difficult (O'Donoghue, 2000). They also tend to underestimate the likelihood of future events, and overestimate the likelihood of events that they can easily imagine, or have recently experienced (Kahneman, 2002). 'Low Carbon West Oxford' was launched in the wake of severe floods in the Thames valley in 2007, for example.

In addition, people may simply deny information that is uncomfortable (Cohen, 2001), and we are also strongly influenced by the way information is presented to us or 'framed'. Cognitive scientist George Lakoff describes 'frames' as unconscious mental structures which structure our ideas and concepts, and shape how we reason, perceive and act (Lakoff, 2004). Research such as this strongly suggests the need to think carefully about how best to frame energy-use issues for example whether in terms of climate

change (which may alienate some people, but help to engage others), energy prices, home improvement, community involvement or other categories. It also suggests that while reputable opinion polls can provide a barometer of general public views⁶, decisions about framing still need to be taken at community level, based on local knowledge.

The influence of emotions and values. The rational choice theory suggests that our conscious attitudes or intentions shape our behaviours. But the literature on social psychology shows how our emotions and subconscious values can also influence our behaviour. For example we build affective relationships with products and respond at an emotional level to choices about what to buy and how to behave (Darnton 2008), and a large part of the marketing industry is built upon appealing to emotion. A thorough account of the influence of values and emotions is found in Jackson (2005).

Our behaviour can also be influenced by our values, which are understood as guiding principles and relatively stable characteristics that are constructed relatively early in life and which therefore may not be fully conscious or rational. Stern's 'Value - Beliefs - Norms' theory, for example, sees values as underpinning both beliefs and attitudes, which along with personal norms then influence behaviours (Stern, 2000). In a related challenge to rational choice theory, a number of psychologists have sought to show how behaviour is shaped by various altruistic – e.g. pro-social and environmental – values, rather than merely self-interest (e.g. Schwartz, 1977; Cialdini, 1990). Schwartz identifies a comprehensive set of ten different types of value, which are recognized across cultures and have a coherent 'circular' structure of relationships (Schwartz, 1992). He groups them into 'self-enhancing' and 'self-transcendent' values, and 'openness to change' and 'conservatism'. Self-enhancing values relate to financial rewards, power, achievement, security, and hedonism, and are largely external to the person. In contrast, self-transcendent values, such as benevolence and universalism, are seen as stemming largely from internal value systems that are independent of social expectations, even if they may initially have been internalised from social norms. Altruistic and self-interested values are present in all people, but only exert a significant effect on behaviours if *activated*, for example, by increasing awareness of the consequences of their actions on others and/or the likelihood of being held responsible (Schwartz, 1977).

Altruistic and self-interested values are understood to act in opposition to each other. Some evidence suggests that appealing to self-interested values such as social status, power, or envy in order to promote pro-environmental behaviours will 'crowd out' altruistic pro-environmental or social motivations and thus be counter-productive in the long run (Frey and Jegen, 2001). So, for example, appealing to people to install insulation *only* on the grounds of money saving may lead to them using financial savings to *increase* consumption of other goods or services (the rebound effect – see section 4.1 below). Similarly, although financial incentives may be useful to overcome specific barriers or to encourage one-off behaviours, their effect is short lived and may override altruistic motivation if they are very large (Bartram 2009). This evidence has important implications for community groups both in relation to how they 'frame' their communication messages but also whether or how they reward volunteers.

Social norms and social identity. There is a body of work showing how individuals' preferences and behaviours may reflect unexamined social conventions, expectations

⁶ E.g. see <http://www.ipsos-mori.com/researchpublications/researcharchive/poll.aspx?oltemId=2620> for a survey on climate change and energy supply

and assumptions about what is 'normal' or 'desirable' (Shove, 2003; Whitmarsh, 2011). Evidence suggests that people are strongly influenced by 'social norms' i.e by how they believe particular behaviours will be viewed by others (Ajzen and Fishbein 1980; Cialdini 1993). We are particularly likely to be influenced by how other people are behaving in ambiguous situations, or in crises (Cialdini, 1993). We are also influenced by people in authority (Milgram, 1974), and by people we like or share commitments with (Kahan, 2010), with the effects of the latter being more lasting (Halpern et al., 2004).

People are therefore more likely to adopt pro-environmental behaviours if they think others like them are doing the same. Conversely, they may choose *not* to act if they think others like them will disapprove, even though they may be personally enthusiastic. Simply communicating that other people are behaving in certain ways – normal appeals – can be persuasive, even without supporting arguments (Cialdini, 2003; Bartram, 2009). It also suggests that the messenger who delivers pro-environmental messages, or demonstrates pro-environmental behaviour, can be as important as the message itself (Halpern, 2004).

There is also evidence that consumption practices can be as much a way for people to express social identity and status as a way to fulfil their individual preferences, something which is particularly evident in car choice and use (Whitmarsh, 2011). So, for example, a person may refuse to use an energy-saving appliance if it doesn't fit with their lifestyle/social identity. Another implication is that individuals may reject new information (e.g. about climate change), if accepting it would challenge or threaten existing values or social identity (Festinger, 1957, quoted in Halpern, 2004). Indeed, this form of 'protective cognition' is believed to be a major cause of political conflict over the credibility of scientific data on climate change and other environmental risks (Kahan, 2010).

The role of habits, routines, behaviours and practices. Behaviours often reflect unconscious and frequent *habits or routines*, rather than rational decisions. This is seen as particularly relevant to energy behaviours, due to the 'invisibility' of much energy use, and the routine way in which so many environmentally significant behaviours in the household are carried out (Whitmarsh 2011). Triandis' theory of interpersonal behaviour (Triandis, 1977, quoted in Darnton 2008), for example, places habits as the primary determinant of behaviour (an argument in danger of circularity). There is some evidence that this approach can be more predictive of behaviours than models which prioritize beliefs and intentions, such as the Theory of Planned Behaviour (Ajzen, 1991). An important implication for community groups is that changing habits or practices is likely to require repeated and conscious cognitive effort, even if a new behaviour carries substantial benefit (Jackson, 2011). The evidence, suggests that regular prompts can help encourage simple behaviours, but they do not promote attitudinal or motivational change in themselves (Bartram A, 2009). However, as noted earlier, in recent years, there has been a shift in the research literature, from seeking to understand individual habitual behaviours to trying to understand social *practices* – socially learned and taken-for-granted ways of acting that are acquired through the activities and experiences of everyday life (see below).

Agency and intention. Agency is another important influence on individual energy behaviour. In rational choice theory it is understood in a relatively narrow way, relating to actors' consumption preferences and decision. In the psychological literature, agency (or self-efficacy, or personal capability) is understood as 'the conviction that one can successfully execute the behaviour required to produce outcomes' (Bandura, 1977).

More simply put, it is a person's belief that they can take meaningful action. This in turn is understood as having an important influence on whether people attempt a given task, how much effort they will expend, and how long they will persist in dealing with stressful situations (ibid.).

The concept of self-efficacy has been incorporated in many 'adjusted' expectancy-value or rational-choice models. The Theory of Planned Behaviour, for example, contains a variable called 'perceived behavioural control', defined as a person's belief about how easy or difficult a particular behaviour is likely to be, which, along with social pressures, influences an intention to act (Ajzen, 1991). Both are seen as having an important influence on behaviours, although this is proportional to the amount of actual control an individual possesses. We explore the interactions between perceived and actual agency below in section on external influences.

The psychological literature understands agency or self-efficacy to be shaped by people's previous accomplishments, their observation of others and the effects of action on them, verbal persuasion, and physiological states (Bandura, 1977). People may also be more likely to act if it is clear to them that it is their responsibility, rather than thinking they can leave it to others (Cohen, 2001). And they may be more likely to take action if they make their intentions public through written or public commitments (Cialdini, 2005, Bartram, 2009).

As we see later, the literature on power suggests that people's sense of agency is also shaped by their internalisation of dominant cultural ideas, values and power relations – or enculturation. This can shape how they think about themselves, their social identity and place in the world, and can prevent them from envisioning possibilities for change, or seeing themselves as agents of change (Lukes 2005).

A focus on agency suggests that people should be viewed as actors, at the heart of change processes, rather than passive targets of information or incentives (Darnton, 2008). It also indicates that interventions need to be designed to strengthen individual agency (whether motivation, awareness, confidence, skills or knowledge) where this is lacking. Community groups may be well placed to fulfil both these roles by virtue of their proximity to people, and because individual motivation and agency can be strengthened through community action (Bunt, L. 2011, Cox, J. et al, 2010).

While the focus of much of the energy-related literature is concerned with individual agency, the community development and sustainable development literature also emphasizes group/collective agency or capacity which is of particular interest to this project. We explore this in Section 5 on Change Strategies. First, though, we look at external influences on energy use.

4. 'External' influences on energy use

Rational choice theory (and many psychological theories) have been strongly criticised for assuming that energy behaviours are simply a matter of individual choice, and for neglecting the way that choices are shaped and constrained by 'external' factors, outside the direct control of individuals. This section reviews some of the literature about external factors and forces which influence local energy-related practices and energy use, and the interactions between them.

It first summarises some of the economic influences on energy behaviours and use, which have tended to dominate policy making. It then looks briefly at the influence of other factors on energy use including: socio-technical interactions and systems; social structures (social practices, cultural values, groups and institutions, socio-economic disparities, and power relations); and finally public policy.

An important implication of this strand of the literature is that individual and community action is constrained by external or structural influences which are largely beyond their control. However, they may be able to *moderate* these wider influences, for example, when they set up bulk-buying programmes to influence prices, help residents negotiate with landlords, help ensure that energy efficiency programme reach and benefit low income and vulnerable groups thus reducing local inequalities, encourage new practices and social norms, develop alliances to press for legislative changes, disseminate good practice etc.

4.1 Economic influences and market structures

As noted above, rational choice theory posits that price, income and products all influence energy use, which we examine here. We also look at how our dominant economic growth model shapes cultural values and hence energy behaviours. However, it is beyond the scope of this paper to explore how wider economic influences, such as market structure, the distribution of wealth, international trade and investment rules, affect energy use.

Energy prices. Conventional economic theory predicts that increasing the price of a good or service will reduce demand for it. But because some aspects of residential energy use constitute essential services (e.g lighting and heating), and other aspects are 'locked in' by technologies and by social and cultural influences, demand is widely believed to be inelastic and slow to respond to price rises, at least in the short term. (Thumim et al., 2007, review this with reference to the UK.) In the short term consumers therefore may find it difficult to *reduce* their demand, use *alternative* sources of fuel, and buy more *efficient* appliances. Conventional wisdom therefore views energy prices as a minimally effective way of reducing energy demand in the short term. However, over the long term people can adjust to changes in unit price, and do not necessarily have to pay higher bills if they can improve their efficiency of usage (Verbruggen, 2003). For contrasting views on whether high energy prices are needed to reduce energy demand, see Reiss and White (2008) and Platchkov and Pollitt (2011).

Higher energy prices pose a serious difficulty for people on low incomes, unless they are compensated in other ways. Because fuel bills represent a relatively high proportion of their household income, in the short term they are likely to be *more* responsive to energy price rises than richer households, and to cut back on energy use or essential items. Low-income households are more likely than others to rely on electricity for their heating, the most expensive per kWh of delivered energy (and also the most polluting) (Boardman, 2009). However, in the long term they may be *less* responsive to rising energy prices than richer households, as they are less likely to be able to afford new efficient appliances and efficiency measures for their homes. Without compensatory measures, they will suffer deprivation and discomfort from rising prices in the short term, and suffer economically over the long run (Vandenbergh and Ackerly, 2008). As we see below, this also poses a challenge for climate change policies, as many policy measures which are designed to reduce household carbon emissions also raise energy prices (Preston, White and Guertler, 2010).

Income levels, carbon footprints, and responses to efficiency improvements.

Roberts (2008) found that, in general, carbon footprints increase slightly with income until the highest income levels are reached, where there is a rapid increase. However, some low-income households in the UK are relatively high carbon emitters, due to living in poor housing and needing a lot of fuel in order to stay warm (Pett, 2009; Grant, 2001). In Germany, where housing standards are generally higher, energy consumption is more closely related to income (Grant, 2001). It is difficult to get an accurate idea of the numbers involved, but one analysis based on the English House Condition Survey and the Family Expenditure Surveys of 1999-2000 and 2000-2001 indicates that nearly 30% of households in the lowest income decile emitted more carbon dioxide than the median emissions for all households (Ekins and Dresner, 2004).

Rebound. Conventional economic theory predicts that increasing the price of energy or reducing the price of energy-efficient goods will increase the uptake of such goods, and hence reduce energy use. But improved efficiency does not normally lead to the level of demand reduction that a simple calculation would lead us to expect. This perverse outcome is known as the 'rebound effect', which takes several forms:

- *Direct rebound effects* occur when consumers spend the money they save due to their uptake of energy efficiency appliances to use more energy, or use an appliance more often (Greening et al., 2000, Sorrell, 2007). For example, insulation or a more efficient heating system may enable a household to heat their home to a higher temperature for the same cost. Or the purchase of a fuel efficient car might mean that the individual can afford to drive their car more often, and does so.
- *Indirect rebound effects* occur when consumers spend the money they save from energy efficiency goods or services on energy-intensive goods or services. So energy savings from subsidised insulation measures may allow a household to buy a new plasma TV.
- *Economic rebound effects* refer to the effects of falling prices for energy goods and services on the economy as a whole. If the cost of energy services decreases, the price of intermediate and final goods in the economy also goes down (because it cost less to make them), and energy-intensive goods become more competitive, thus increasing demand for them.

The most comprehensive summary of the size of the rebound effect in the UK is found in Sorrell (2007) which finds that for household heating, cooling and personal automotive transport, the estimated direct rebound effect is less than 30% (closer to 10% for transport). This indicates that domestic energy efficiency measures and efficient cars *are* worthwhile – only not as worthwhile as might have been predicted. A literature review by Greening (2000) finds that for space heating the rebound effect accounts for 10-30% of energy savings. That is, 70-90% of the expected energy savings are realised. For energy efficiency measure related to water heating and lighting, the rebound effect is estimated to be about 5-12% and 10-30% respectively. DEFRA (2008) assume a direct rebound effect of 15% for all insulation measures.

Low-income households are predicted to have a higher 'rebound rate' from the installation of energy efficiency measures than higher-income households, not least because they start with lower average indoor temperatures. Some studies show this rebound effect increasing to as much as 65% (Milne and Boardman, 2000). However, a 2009 study of the carbon footprints of 30 households indicated that energy efficiency

programmes with low income households may be as effective at saving carbon as for any other social group, that ‘comfort taking’ in retrofitted low-income households might be lower than generally modelled, and that indirect rebound effects can be very low (Pett, 2009).

These figures matter, because there is a danger that the assumption of high rebound rates for low income families will mean that energy efficiency schemes aimed at carbon savings are targeted on the rich rather than the poor. However, to the extent that ‘direct rebound’ effects in low income households occur, they should be seen as an important social benefit, allowing people to increase the warmth and comfort of their homes (Oreszczyn et al., 2006).

The existence of rebound effects suggests that energy efficiency programmes will be more effective if they also seek to reduce *overall* demand for energy services and energy-using practices, including by providing alternatives such as car-sharing, cycle lanes, and better public transport.

Product characteristics. Preferences for goods and services are not formed just on the basis of price but also on product attributes, and the value of these for consumers. This insight is used by marketers to help build brand differentiation between products, particularly where there are close substitutes. The ‘product characteristics’ model has been widely employed and used to explore consumer preferences for product attributes in sectors as diverse as food (Philippidis and Hubbard, 2004) and luxury cars (Anurit et al., 1999). Bergman and Eyre. (2011) have used it to explore how household micro-generation can convey an understanding of energy production and consumption to householders, and thus influence their energy behaviours. The perceived attributes of sustainability as a ‘product’ or ‘brand’ may not always be positive. In a recent study, sustainable choices were frequently perceived to be time consuming and inconvenient, and there was a widespread view that the quality of sustainable products is in some way inferior to non-sustainable alternatives (DEFRA 2008). The designs of many goods and services are outside the influence of many community groups, but they are well placed to influence people’s understanding and use of them – and language plays a part here. And the group itself, and the products and services they offer to local residents, are also likely to acquire brand characteristics which will impact on the way people perceive and interact with them.

4.2 Technology and infrastructure

The availability of energy-efficient and low carbon technologies and infrastructures exerts a major influence on energy use and carbon emissions. In the conventional ‘technology transfer model’, the introduction of innovative technologies follows a sequence from technological research and development to invention, application and diffusion. If new low-carbon technologies are not widely adopted, this can be seen as a result of ‘market failure’, with the implication that central government needs to correct this. However, there are also non-market behavioural issues that affect the uptake and diffusion of technology (Bergman and Eyre 2011).

On the demand side, for example, while energy efficiency policy on lighting and appliances has led to significant reductions in usage per appliance or light, overall domestic electricity consumption in the UK has continued to rise due to the proliferation of energy using devices in our homes (Willis and Eyre, 2011). This points to the need for energy policy to pay greater attention to behavioural and social dimensions of energy

demand. As one paper puts it ‘Buildings don’t use energy – people do’. From this perspective, buildings and technologies may enhance or reduce the impact of people’s energy-related choices, but peoples’ choices also remain fundamentally important (Janda, 2009). This is not to discount the significance of technology and infrastructure, but to put it in perspective.

Similar issues apply on the supply side. If policies or programmes to promote innovation or diffusion of low carbon technologies and infrastructure lacks an understanding of how humans interact with them, they may fail to ensure best practice in installation and use and reduce potential carbon savings. While the policy emphasis of the past decade in the UK has been on providing financial incentives and regulations to promote micro renewable energy systems, including capital cost support and most recently the feed-in tariffs (FITs), not much attention has been focused on *how* the technologies are used (Bergman and Eyre, 2011). There are some indications that the uptake of micro generation technologies by households can prompt pro-environmental behavioural changes, but also that they may ‘lock in’ unhelpful practices, if not accompanied by behaviour change programmes (ibid.). There is also a risk that households may *increase* energy use after installing micro generation technologies, if they believe that their energy source is now ‘green’ and they can therefore use as much as they like.

Hence, there is growing emphasis in the literature on the *interaction* between technologies and human behaviour, and on the need for energy efficiency and micro-generation interventions to be accompanied by complementary strategies on behaviour at the micro level.

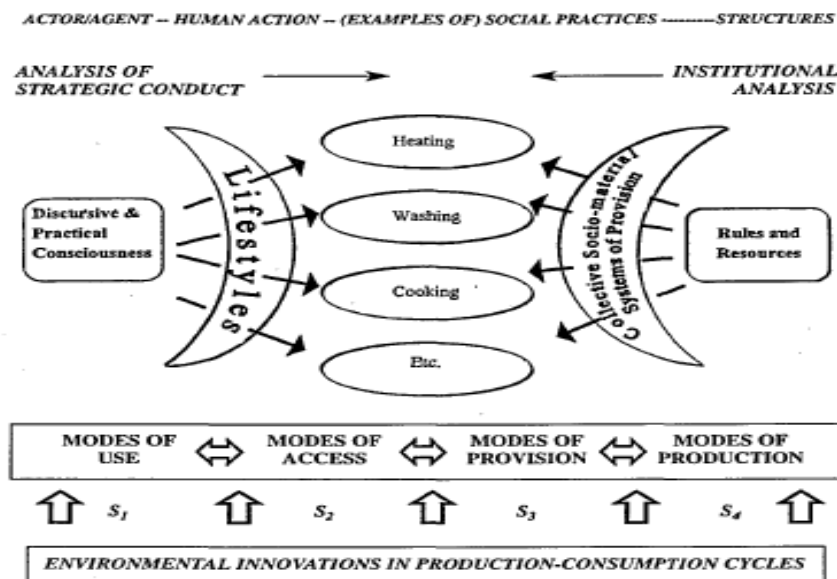
4.3 Social and cultural influences

There are important social influences on energy use, including social practices, cultural values, institutions, socioeconomic structures and power relations.

Social practices. The extent to which individuals are free to make their own choices, or how far they are bound by the external social structures in which they live, has been a long standing debate in the social sciences (Jackson, 2011). Various theorists have, however, sought to move beyond this dichotomy and instead focus on the interactions between personal agency and social structure (e.g. Giddens, 1984; Bourdieu, 1990 (quoted in Jackson 2005); Spaargaren and van Vliet, 2000; Shove, 2003; and Wilhite, 2008). Giddens, for example, has talked about the ‘duality of structure’, where structures are both the product and medium of action

Practice theory focuses on these interactions and proposes that social ‘practices’, rather than conscious individual choices or external structures, should be the main units of analysis. In this understanding people do not usually use energy consciously, but carry out a range of social practices – such as washing, cooking, showering, eating, transport – which happen to use energy. These ways of knowing and acting in the world are learned through the activities and experiences of everyday life. They are ‘social’ because they are influenced by what is considered to be normal or desirable behaviour in a society, and they can become embedded in societies even when their original purpose can no longer be recalled (Bourdieu, 1984). For example, the reasons for eating pancakes on a particular Tuesday in February, or for washing bed linen at a particular temperature, are mysterious to many people.

One model suggests that social practices are influenced on the one hand by individual lifestyles and on the other by systems of provision. Neither set of factors is seen as wholly 'internal' or 'external', and both continually shape and are shaped by practice. This is illustrated diagrammatically below.



'On the left side of the model, human actors – aiming at a reduction of the environmental impacts of their lifestyles- rely on environmental innovations made available to them through systems of provision. On the right hand side, companies, public utilities and governmental agencies involved in the development of more sustainable goods and services have to ensure that environmental innovations fit their lifestyles, their internal domestic organisation as well as their specific standards of comfort, cleanliness and convenience'

(Diagram and text from Spaargaren and Van Vliet, 2000, p.53)

Focussing on social practices can reveal how a person may refuse to use an energy saving appliance not just because it doesn't fit with their lifestyle/social identity, but also because it doesn't fit with their accustomed standard of comfort or their time-space routines; or because they are unfamiliar with how to use it or don't trust the providers (ibid.). Similarly, it may reveal how a lack of priority placed on public transport systems by government can force even 'environmentally friendly' people into using cars i.e. the necessary external conditions for the 'practice' of using public transport are absent (Crompton, 2008). Practice theory thus suggests that, as well as seeking to reduce energy-intensive behaviours head on, we may also need to address them indirectly. So, for example, households may be more ready to adopt energy-saving improvements if they are integrated with other home improvements, or with health and safety advice.

Cultural values. Cultural (shared) values and assumptions strongly influence our behaviours. Jackson has argued that our dominant cultural values of consumerism and individualism are a key constraint on pro-environmental behaviours (2005). As noted above, consumption is driven in part by the desire for status and social identity, rather than need (Lutzenhiser, 1993). And Shove has shown, for example, how people can be 'locked into' certain (energy intensive) consumption patterns such as frequent showering and clothes-washing by prevailing ideas of comfort, cleanliness and

convenience, and by the systems of provision (such as power showers and automatic washing machines) available (Shove, 2003).

Crompton argues that understanding the factors that shape these values should be a primary focus of public scrutiny and debate. Cultural values are influenced by an array of actors and factors, including government, peers, parents, teachers, opinion formers, marketing and communications, the media, and education (Crompton 2008.) Jackson ascribes particular responsibility to government in sustaining consumerist values:

'In setting the pursuit of GDP growth at the heart of policy, governments have inadvertently created a whole range of situational conditions, institutions and cultural norms which now constrain and shape behaviourGovernments are not just innocent bystanders ...They influence and co-create the culture of consumption in a variety of ways.'

(Jackson, 2011, p 208)

An important implication is that cultural change is necessary but is likely to be a long term process (Knotts et al., 2008, Compton 2010), although this may be accelerated by Government action.

The literature on cultural and social influences poses an interesting challenge to projects such as EVALOC. Communities are places where cultural values can be formed, reinforced or changed, whether they are geographical communities or 'communities of interest'. But it could be that studying low-carbon communities, which are small scale and by definition aspirational, is something of a distraction, diverting attention from the main issue, which is that 'What counts is the big ... swing of ordinary, routinized and taken-for-granted practice' (Shove, 2003, p6). Taking this view seriously, it makes sense to examine the possibility that the keener members of LCCs may succeed in altering some of their everyday practices and introducing a few supplementary technologies, while doing little to develop substantial, credible and enjoyable ways of living that are of interest to most of the people living in their communities. Questions that arise from this challenge, for this project, could include:

- How much is a community able to explore and shape new ideas of 'normal'?
- What can a community do that is more than the sum of the efforts of the individuals within it
- Where are the boundaries of a community? How much are those boundaries geographical, and how much do they relate to people's interests?
- How significant is the proportion of relatively uncommitted people 'round the edges'?
- What can members of a LCC do to test out the effects of new norms, to evaluate them and to consolidate the ones which show most promise? (Can LCCs develop 'niches' for new technologies and practices?)
- To what extent is the 'low carbon' concept a durable norm that a whole community will adopt (not just the leaders)? How do its members (and any critics) actually describe a LCC?

Institutions, groups and relationships. Within an institutional setting, energy behaviours can be influenced by organisational policy, leadership, incentive structures, cultures, routines, or organisational structures (Geels and Schot, 2007; Schmidt, 2006). Ultimately, employers have the power to influence employees' behaviour through their ability to hire and fire. Similarly, the literature on organizational psychology and social

learning shows that individual behaviour is highly influenced by group identity with individuals facing the sanction of being ousted from the group if they do not adhere to accepted standards (Tajfel 1982 quoted in Jackson 2005; Lewin, 1952). The implication of these findings is that in order to change individual energy behaviours, we also need to change group standards and norms.

Socio-economic disparities. Socio-economic disparities shape environmental attitudes and behaviours in many ways. We list some of these here, as a guide:

- *Preferences:* Bourdieu showed clearly how [social class](#) in France can shape a person's likes and interests, how [distinctions](#) based on social class are reinforced in daily life, and how social origin can be a more influential factor than education or economic capital (Bourdieu, 1984). There is also some evidence that inequality drives excessive consumption (Wilkinson, 2009), and low self-esteem of some low-income individuals may drive spending on high-status goods (Sivanathan, 2009).
- *Attitudes:* one four-country comparative analysis of the relationship between social exclusion and environmental attitudes and behaviour showed much lower levels of concern about 'the environment' among lower- than higher-income groups in Britain (Grant, 2001). However, findings like this need interpreting with care, as people living in disadvantaged areas disproportionately experience poor environments each day, and many are very concerned about this. Much depends on how 'the environment' is defined and framed by researchers and respondents, and whether this is done in a way which includes issues of concern to low-income groups (Lucas et al., 2003; Irwin et al., 1999).
- *Income:* we see above how income shapes responses to energy prices and can constrain the access of low income groups to energy-efficient or low carbon technologies, reinforcing economic disadvantage.
- *Discount rates and upfront costs:* lower-income households may have a greater preference for rewards in the short term rather than the long term (Halpern et al., 2003). This means that even though financial savings from reducing energy use may be more significant to low income groups, they may be less willing to adopt efficiency measures that only yield financial savings in the longer term, assuming that they can afford the up-front cost in the first place (Vandenbergh and Ackerly, 2008).
- *Agency/self-efficacy:* the comparative study by Grant (2010) showed a lower sense of empowerment about the environment among lower income groups than other groups in Britain. Less than a quarter of people in the low income group surveyed felt that they could do anything about the environment. (Interestingly, lone parents were more positive than other socially excluded groups, possibly because they feel less excluded than others through their connections with schools and child health clinics, etc.). The study also found that low-income groups were less likely to sort their waste and to maintain their cars than wealthier groups, and that 'income-based forms of social exclusion are significant' in Britain. These findings suggest that building inclusive and practice-oriented communities, in which skills are passed on as a part of community life, is likely to have a valuable effect on agency.
- *Structural barriers:* lack of time, money, encouragement, facilities and storage are often barriers to action (see Blake's 'Value Action Gap' below; DEFRA, 2008). Time is also often cited as an important constraint which may mask a range of other issues such as

long working hours, child care (LCWO, 2011). Decisions to adopt behaviours like recycling are as likely to depend upon the existence of appropriate local facilities as on positive attitudes. Similarly, the availability or unavailability of reliable public transport places constraints on travel choices. Low-income families are more likely to live in areas of high density housing, with poor recycling facilities or kerbside service (RRF 2002, quoted in Jackson, 2005).

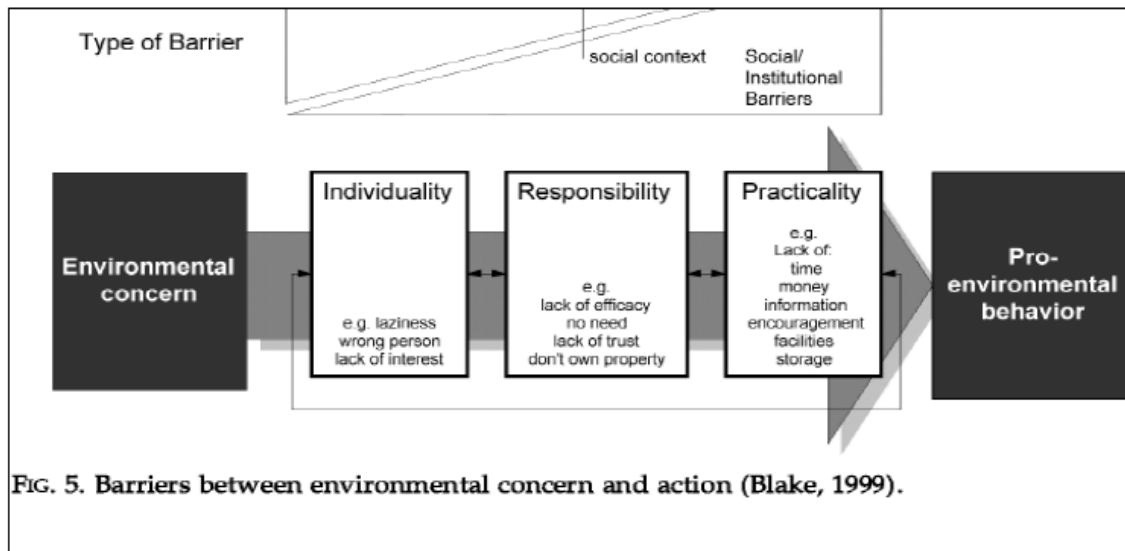


FIG. 5. Barriers between environmental concern and action (Blake, 1999).

Where members of socially excluded groups are predisposed to pro-environmental behaviours but constrained by lack of time, income, agency or structural constraints, then policies and interventions need to be designed to address these issues. They have more chance of success if members of these groups are involved in the initial policy or programme design as well as implementation (Grant, 2001; Buell, 2011). Nevertheless, without government action community groups are unlikely to have much influence on their own in tackling structural influences

Power Relations. Energy use is affected by power relations operating at all levels of society and so are our attempts to change our patterns of supply and demand. Proposed changes to energy supply and use are likely to generate resistance from large oil companies, electricity suppliers, manufacturing and retail firms reliant on consumer products, and individuals whose social identities are tied up in consumerist lifestyles. The desired changes may also run counter to dominant cultural values and ideas, which may reflect the interests and ideologies of power interest groups or elites (Lukes, 2005).

Power operates at different levels – individual, household, group, community, national and international – and takes different forms ‘power over’ others, ‘power to’ effect change, and ‘power within’ (Gaventa, 2006). ‘Power over’ others - the conventional understanding of power – can be characterised as being exercised in two main ways. ‘Hard power’ is essentially coercive and derives from the use (or threat of) economic sanctions or physical force. ‘Soft power’ is based on persuasion, attraction and/or consent. For community groups, it may be derived from factors such as legitimacy (e.g. the numbers or types of people that they represent; and types of relationships they have); knowledge or expertise (e.g. direct experience of an issue or locality); credibility and reputation (e.g. trust, transparency or past performance); reward power (e.g. the ability to offer incentives and publically praise or shame policy makers); or ‘position power’, from being well networked (Mayne and Coe, 2010).

Different forms of power may operate through *visible* influences on regulations and institutional practice; through *hidden* influences on regulations and institutional practice (behind the scenes); or through *invisible* dominant cultural ideas, values and social controls. The latter may initially be promoted through state institutions, the media and opinion makers, but over time they become accepted as basic ‘truths’ (Lukes 2005).

Resistance to change can be reduced by the development of win-win scenarios (e.g. government investment in green infrastructures to reduce carbon emissions *and* generate jobs); ensuring a fair distribution of the costs and benefits of low carbon interventions including compensation of losers; and/or building new social norms and practices from the bottom up. But a key implication from the power literature is that to be successful, low carbon change strategies will need to address these different types and forms of power, confront vested interests where necessary and consider the role of intermediaries in making things happen. (Rowland, 1997; Miller et al, 2006).

4.4 Systems and Transitions

At systems level *Transitions theory* offers an interdisciplinary perspective on the interactions between energy technology/infrastructure and society at micro, meso and macro level, drawing on science, the sociology of technology, institutional theory and innovation. It can be criticised for neglecting the role of agency and purposive strategy, overemphasising the role of technical rather than socio-technical innovations, and underplaying the role of government in directing change (beyond a role in supporting niche innovations). But it supplies several useful insights. One useful concept is the multi-level perspective (MLP) which argues that transitions come about through interactions between *niche* innovations (micro-level innovations); socio-technical *regime* (meso-level norms and practices); and the *landscape* (macro-level economics, cultural values, demography and natural environment that actors can only influence in the long run). In this approach system change is generally seen as very hard to achieve, but may occur when niche-innovations build up momentum, e.g. through the demonstration effect, price/performance improvements, and/or support from powerful groups. Changes in the ‘landscape’ can put pressures on a socio-technical regime, and destabilisation of the regime then creates windows of opportunity for niche-innovations to spread (e.g. Geels, 2007).

Niche-innovations are seen as particularly important potential sources of change. These may be developed by small networks of dedicated actors, often outsiders or fringe actors, and may require initial period of protection or ‘incubation’ (Geels, 2007). There is some evidence that low carbon community groups are sources of niche social-technical innovation, and can help motivate people to take up these innovations (Bunt and Harris, 2010). By acting in concert, and developing alliances, with other actors community groups can also exert influence on policy framework and hence potentially influence the choice and nature of new technologies and infrastructures. In the language of transition theory, they can translate and communicate changes in landscape, develop niche innovations, and actively seek to influence regime.

4.5 The policy framework

We have left government policy until last, as it plays such a critical role in influencing energy behaviours and energy use, whether directly through regulation, or indirectly by addressing structural influences on energy use (e.g. through policies affecting

growth/markets, cultural values, income distribution, social structures, and institutional practices).

Economic theory recognises that government intervention may be necessary to correct market failures, provide public goods and ensure particular social or environmental goals. Classic policy instruments include:

- information – to inform individuals of the costs and benefits of production and consumption choices and behaviours, and to highlight new and more desirable ones (examples in Darnton, 2008).
- price signals and incentives – taxes and subsidies to encourage or discourage certain technologies, goods, services or behaviours e.g carbon taxes or participation in emissions trading; funding research and development of more efficient technologies; capital grants or feed in tariffs to promote particular behaviours or technologies.
- regulation – to make certain technologies, goods, services, or behaviours compulsory or illegal, e.g. regulation to hasten the retirement of highly polluting plants; building regulations; standards for electrical appliances and vehicle emissions.
- direct provision of public transport or other infrastructural services (DEFRA, 2008) e.g. recycling, installing energy efficient measures, and conditions for public procurement.

Elements of the evolving policy framework in the UK include building regulations, appliance labelling, minimum efficiency standards for private rental accommodation (forthcoming), CERT (Carbon Emissions Reduction Target) energy supplier obligation), renewable obligations, electricity market reform, feed in tariffs, the Renewable Heat Incentive, the Green Deal (probably), and a Green Investment Bank. All will have some impact on energy initiatives at local level, as well having distributional implications.

One example of a successful policy intervention is the provision of information, financial incentives and mandatory minimum standards for energy efficient electrical appliances in many OECD countries (International Energy Agency, 2000). Upstream regulation may provide a more effective and straightforward approach e.g. through imposing strict limits on carbon emissions produced by power stations, but this involves confronting vested interests of oil, gas and coal industries.

In recent years there has been a focus on the role government can play in mitigating climate change by: persuading rather than forcing people to adopt desirable behaviours through regulation; by encouraging a sense of personal responsibility and greater partnership between service users and providers; and by supporting communities (and other actors) to reduce energy use (Halpern and Bates, 2004). ‘Nudge’ theory, derived from behavioural economics, has been influential here. It recommends influencing behaviour by altering the context in which people choose, rather than directly regulation behaviours e.g. through rewards, prompts, opt-outs from pension schemes etc (Thaler and Sunstein, 2008). However, the recent [House of Lords](#) Science and Technology Committee report on behaviour change concluded that, while ‘nudges’ had the benefit of respecting individual freedom and costing little to implement, there was as yet no evidence of their cost-effectiveness, and that:

*non-regulatory or regulatory measures used **in isolation** [our emphasis] are often not likely to be effective and that usually the most effective means of changing behaviour at a population level is to use a **range** of policy tools, both regulatory and non-regulatory (HoL, 2011).*

There is also evidence that at local level the coordination or provision of energy efficient and low carbon technologies by local authorities is an effective way of enabling priority groups (i.e. people on low incomes, elderly or vulnerable) to benefit. (DECC, 2011)

We summarise the implications of various internal and external influences on local energy use for the design of community carbon reduction strategies in Annex 1.

5. Change Strategies

The UK Low Carbon Transition Plan has identified three main (interconnected) elements that need to change: energy demand reduction (including gains from increased efficiency), electrification of more end-uses, particularly heating and transport, and decarbonisation of supply. This review has also identified a range of possible influences on local energy behaviours and use, identified by different theories. However, as noted above, as well as identifying *what* to achieve it is also important to understand *how* to achieve change. This involves also understanding the processes of change, including interactions between different influences and energy use, and the direction of change, as discussed above. As seen above, a transitions theory multilevel perspective suggests that systemic change will come about through interactions between landscape, regime and niche innovations (Geels, 2007). We have also suggested that achieving change also requires purposive strategy, and have suggested that government action will need to be complemented by a range of coordinated and mutually reinforcing interventions by a range of actors. There is already some evidence on which to build, showing how a combination of interventions at different levels can have a desired effect. Statistics on energy use in the British housing stock over the past 40 years show how a combination of insulation programmes, product standards and building regulations, fuel price rises and (more speculatively), raised awareness, appears to be bearing some fruit now, with residential energy use falling since 2004 (Willis and Eyre, 2011; Palmer and Cooper, 2011).

LCCs are thought to be well placed to contribute to carbon reduction strategies in a number of ways (Bunt, 2010). In this section we briefly assess the relevance and effectiveness of the following bottom-up change strategies for low carbon communities. While the different theories underpinning them may offer competing explanations of the key drivers and obstacles to change, in practice communities can, and do, use different change strategies and interventions in a mutually reinforcing way (informed by their understanding of local influence on energy use, their mandates, and their capabilities).

Change process or strategy relevant to community group: relevant theories	Level	Influences on energy use which strategy seeks to change	Possible specific interventions by LCCs
Changing behaviours and practices (voluntarily) Rational choice, social learning; behaviourist, practice theory, communities of practice,	Individual group and 'external'	Agency, knowledge, social norms, habits, voluntary behaviour,	Information; feedback; practical advice/support; norm appeals, commitments/goal settings; prompts; financial incentives
Strengthening agency and capacity Power relations (various)	Individual and group	Agency, power relations, knowledge, social norms,	Action research, empowerment, peer to peer learning, capacity building
Niche innovation and diffusion of socio-technical innovations Innovation theory; transition theory; social network theory	Individual, group, and external	Adaption and use of energy- efficient and micro generation technologies, behaviours	Social networks, community to community mentoring, partnership working, policy influencing
Changing policy and widening democratic space Social change theories (eg functionalist, liberal democratic, Marxist); social movement theories; power relations (various), institutional theory.	External	Policy framework & incentive framework (and hence behaviours, technologies and infrastructures, institutional practices energy behaviour, social structures, cultural values)	May include one or more of: persuasion (e.g through research, dialogue, lobby, identification of win-win solutions; partnership working); modelling/demonstrating change; pressure (e.g through alliance building, popular mobilization, civil society strengthening; direct action)
Changing cultural values Social learning, critical theory & pedagogy, socio-psychological	Individual, group, external	Cultural values, public attitudes and beliefs, knowledge	Social learning, critical awareness raising, social marketing campaigns; public campaigns

5.1 Changing behaviours and practices (voluntarily)

Different theories highlight different influences on individuals' (voluntary) behaviours, and hence different change strategies and interventions. For example, rational choice theory emphasises the importance of interventions focussed on information, price and product interventions; psychological theories highlight the importance of non-price interventions such as framing, value activation, norm appeals; and behavioural

economics, including nudge theory, highlights the importance of environmental interventions that alter the context in which individuals take decisions.

Social learning theory adds a useful perspective by emphasising that behaviour change comes about through a *social process* in which people actively construct or build new ideas or concepts based upon their experience and interaction with others. (Bandura, 1977). A first strand emphasises the ways in which individuals learn and are influenced through their observation of different social ‘models’, including the behaviour of parents, friends and those portrayed in the media. Importantly, it also highlights how individual behaviours are influenced by group standards (individuals either adhere to them or are ousted from the group) and therefore how group standards must be altered if individual change is to result (Lewin, 1952).

A second strand of social learning is the way practical know-how is passed on between people through everyday practices (Lave, 1993). This often goes unremarked, as it is so much a part of normal life, but sustainable living requires skills such as maintenance and repairs, cooking, gardening and organising transport, and these have to be learned through practice and, often, imitation.

A third strand, linked to observational learning, is feedback. Feedback is a necessary element in learning, whether we are learning to walk (and receiving feedback from our nervous system), learning history (in which case we probably need feedback from a teacher), or learning to manage a heating system (when we will be able to learn something from the warmth of our surroundings and the size of our heating bills). In the days of solid fuel and candles, it was relatively easy to manage energy use, as it was a very visible process: the size of the woodpile, or of the stock of candles, told the user how fast they were burning up the stock, and when it would need replenishing. Energy use in modern buildings is typically much less easy to track: the only quantitative feedback may come from the bill, which does not arrive very often and does not tell us how much energy is consumed by different appliances or end-uses.

Below we look at a range of different interventions which aim to influence individuals’ voluntary energy behaviours informed by these different theories. Evidence suggests that a combination of interventions is likely to be more effective than single interventions (Bartram, 2007; Abrahamse *et al.*, 2005).

Feedback: Improving consumption feedback to householders was first considered as a means of achieving residential energy conservation during the late 1970s (e.g. Sonderegger *et al.*, 1979). Interest in feedback has grown markedly in recent years, not least because of rising fuel prices, environmental concern, and the development of ‘smart’ metering (this makes accurate, frequent bills simpler to produce) and home energy displays. Darby (2010) summarises feedback research that is particularly relevant to the UK. The main points of relevance to LCC research are that:

- Qualitative evidence for the benefits of feedback in raising awareness is strong, though this does not always translate into useful action. For people who are not interested in their energy use, or do not feel that they can control it, awareness-raising can be a valuable initial step.
- Opt-in experiments and trials with in-home displays show promising results in the short to medium term, mostly but not always with customers who are already motivated. Energy savings are typically in the range from 4-15%.

- However, displays can also cause frustration in people who cannot use the information to improve their situation, and they can cause conflict in the household, for example when one member wants to make changes in thermostat settings or appliance usage and another does not.
- Feedback should ideally be tailored to circumstances.

There are challenges ahead to widen the motivation to understand energy use, to use displays as part of wider programmes (eg community initiatives or retrofits), and to maintain interest

In EVALOC, we are interested mostly in *how* feedback is used, what impact it has on thinking and practices, how important it is compared to other interventions, and in how a simple piece of equipment, the energy display, is adopted into peoples' lives. Also, in whether the fact that it is introduced into a community effort makes a difference to the ways in which it is used e.g. is it a topic at community events? Are people recommending displays to their friends, discussing how to use them, or leaving them abandoned in dark corners? Therefore the qualitative research into feedback is of particular interest. Hargreaves et al. (2010) offer insights into how people use energy displays in their homes over a period of time, showing that the displays can be very useful but also that they can lead to family arguments, or cause anxiety and disaffection. This is a useful corrective to the view that feedback displays are always going to be an asset, and it points to ways of improving the user-friendliness and effectiveness of displays, for example by offering advice at installation and afterwards. Anderson and White (2009) tried out a variety of electricity displays with members of focus groups and asked them to design their ideal display. They found that effectiveness was related to ability to:

- make energy usage visible and intelligible;
- *complement* what the user already knows about their home, routines and practices;
- provide *actionable* information, linking usage levels with specific actions, end-uses or processes;
- *maintain* user interest by giving useful information and allowing for interactivity and learning;
- be used at *a number of levels*, from ambient signals to detailed interrogation by the user.

(Ibid., p6)

The Anderson and White study also found that the displays motivated a range of actions, which they summarised (p10) as:

- Turn it off
- Use it less
- Use it more carefully
- Improve its performance
- Replace it / use an alternative

All of these are worth considering when measuring outcomes from feedback displays.

Practical advice and support. Darby's (2010) summary of feedback research showed that, perhaps not surprisingly, providing *tailored practical advice* with feedback, or with direct installation of efficiency measures, will tend to give better results than single interventions (see sections below on strengthening agency and policy). A 'fit and forget'

attitude to feedback interventions, such as the provision of an in-home display or a website with no additional information or opportunity to discuss them, will only tend to lead to savings for people who already have the motivation and understanding to make use of them. Others will need additional support, and/or exceptionally good design that make the feedback engaging and self-explanatory. Once no-cost energy-saving responses are exhausted, many householders need guidance on how to access available resources to invest in energy efficiency.

Financial rewards. Studies suggest that financial rewards (over and above the incentive of lower bills from reduced consumption) are normally effective only for as long as the incentive lasts (Darby, 2010). They appear to add little when used in combination with commitment or feedback that can't be achieved by the commitment or feedback alone, and large incentives may override intrinsic motivation. However incentives can be useful successfully to encourage one off behaviours such as survey participation and more valuable if they are used to overcome specific barriers to performing a targeted behavior (Bartram, 2009).

Norm appeals. Norm appeals have been shown to influence attitudes and behaviours, when incorporated into messages or when community leaders are used to promote the desired behaviour (Bartram, 2009; Cialdini, 2005; Allcott, 2009).

Commitment and goal setting. Encouraging people to make a commitment appears to be an effective tool to promote behaviour change. Evidence suggests it is more effective when made by an individual than a group, written rather than verbal, public rather than private, and involving a specific rather than a general goal. Combining commitments with feedback appears to be particularly effective (Bartram, 2009).

Community programmes. The research literature shows the potential significance of other actors than the energy suppliers in harnessing public trust and motivation to address energy and environmental issues. Community programmes can be highly effective, though sometimes costing a lot in time and resources, which points to social and educational factors at work beyond the usual range of economic incentives and information (Darby 2010).⁷

The concept of 'communities of practice' is also relevant to social learning and behaviour change as it emphasizes the processes by which groups of people with shared interests build knowledge through regular interaction (Franklin et al., 2009). It suggests that low carbon community groups can be seen as testing out new practices, acting as role models or exemplars, and providing feedback to participants and to funders about the impacts of changes they have made. There is also extensive learning and networking *between* LCCs (Parag and Hamilton, forthcoming).

Multiple interventions. Initiatives which combine interventions are likely to be more effective than those that only use one (Bartram, 2009). A review of 38 household energy

⁷ The evaluation of the Big Green Challenge low carbon community groups suggested that community approaches supported behaviour change in the following ways: 'opening up channels to audiences that would not otherwise be reached; face to face contact, enabled by the availability of volunteer labour resources; being seen as a trusted messenger thus increasing receptivity to new ideas; an ability to disrupt habits, through direct and/or repeat contact with individuals in the community; practical advice and hand-holding, at a depth and intensity and with a degree of personalisation unusual in mainstream services; groups acting as a community resource and pool of know-how; and benefits from a sense of collective endeavour, most notably a greater sense of agency, personal capability, and accountability to others' (Cox, J. et al., 2010).

conservation interventions showed that successful strategies involve a combination of antecedent interventions such as commitment, goal setting information and modelling with consequent interventions such as feedback and rewards (Abrahamse *et al.*, 2005).⁸

5.2 Strengthening agency and capacity

The strengthening of individual agency and group capacity (whether motivation, confidence, knowledge and/or skills) is an important, but sometimes neglected, ingredient for successful behaviour change strategies.⁹ As we have seen above, an individual's perception of their own agency has an important influence on whether they attempt a given task, how much effort they will expend, and how long they will persist in dealing with stressful situations. Efficacy is influenced by internal factors such as personal experience and past accomplishments, as well as the internalisation of dominant cultural values (enculturation). But people's ability to act can also be constrained by external structural factors including group/institutional practices, socio-economic disparities or power relations. Below we examine different approaches to strengthening agency.

Action research. Action research has its roots in critical social theory which seeks to critique and change society, and critical pedagogy which seeks to emancipate people from internal and external systems of social and cultural domination. It involves cycles of theory, application, evaluation, reflection, and then back to theory.¹⁰ These processes of individual or group 'conscientisation' and 'praxis' are held to contribute to wider social transformation (Freire, 1972). Action research has also been used widely to involve marginal groups in decision making and/or address and improve practical problem solving. (This issue is covered in detail in the EVALOC review of action research by Jo Hamilton.) Because it is often based on group processes, it can help transform group standards and norms, which supports individual change. Practice theory is also relevant here as it emphasises the importance of helping people examine internalised symbolic and social meanings, as well as emotional factors, relating to climate change and lifestyle issues.

Sources of power. The processes of conscientisation and praxis outlined above help strengthen people's 'power within'. However, individuals and groups can also increase their 'power to' effect change, and 'power over' others, by strengthening their knowledge and expertise, legitimacy and credibility, as identified in the section on power relations above. This can help increase their influence both within their community (e.g to attract and engage more people), and vis a vis other actors such as local or national government (e.g to diffuse innovations, enrol partners or influence policy) (Mayne and Coe, 2010). It is important that communities use their power in an

⁸ The study also recommended that interventions are based on a diagnosis of the determinants of energy behaviours, address barriers to change, and target macro-economic factors (Abrahamse *et al.*, 2005).

⁹ Strengthening group agency is sometimes referred to 'civil society strengthening' in the international development literature and is seen as an important way of involving marginalised groups in decision making and getting neglected issues onto the policy agenda.

¹⁰ An important distinction is made in the literature on action research between single and double loop learning (Argyris and Schön, 1978). In single-loop learning, people modify their actions according to the difference between expected and obtained outcomes: to give a very simple example, they turn the heating up if the living room is colder than they expected. In double-loop learning, they question the values, assumptions and policies that led to the actions in the first place: for example, they decide to wear warmer clothes indoors. Transformational behaviour change requires learning through continuous loops which expose and reshape underlying assumptions, and action research is a part of this process.

ethical, inclusive, democratic and accountable way so they do not replicate unequal power structures or cement or exacerbate existing inequalities. (Within the community this may involve seeking to engage and empower marginalised or disadvantaged individuals and address barriers to participation e.g. by providing crèches at meetings, helping people access grants, giving practical support to make changes as simple as possible, having meetings at times that respect different working and living timetables, visiting people at home if appropriate, keeping language accessible, and offering translation if needed).

Capacity building, mentoring and peer-to-peer learning. Capacity building is an important but sometimes neglected way of strengthening individual and group agency, and hence increasing the success of behaviour change strategies. In contrast to ‘action research’ and ‘communities of practice’ discussed above, capacity building tends to entail the transfer of knowledge from external bodies to community groups and residents. This may include the provision of information, training and practical advice and support as outlined above. This can be very important for community groups, particularly when they need to supplement their existing knowledge and skills (Owens, 2000). But it can also be ineffective and disempowering if it downplays communities’ own knowledge. Community-to-community mentoring and peer-to-peer learning can help avoid this problem, but has sometimes been criticised by professionals for disseminating non-evidenced-based information.

5.3 Changing cultural values

We have seen above how cultural values shape behaviours. Because they are deep-rooted and come to be seen as common sense, they are notoriously difficult to change, and rarely change rapidly, except in occasional extreme circumstances such as revolutions and disasters. In this review we discuss three types of change interventions that may assist with transforming cultural values: social learning methods (discussed above), social marketing approaches, and government leadership and policy.

Social marketing involves the application of marketing knowledge, concepts, and techniques to achieve social rather than commercial or economic objectives (Prendergast, 2008). It seeks to influence people to voluntarily change their behaviours through public information or advertising campaigns, informed by insights from psychology, sociology, economics and anthropology (McKenzie-Mohr, 2011), and may be accompanied by complementary interventions. One of the underlying principles is that behaviour can be influenced by providing people with the right information in the right way, based on their existing attitudes and behaviours. This involves *segmenting* the public and ‘framing’ and tailoring information to their particular interests, and may also use ‘social norms’ messages.

Social marketing can have the advantage of being less resource-intensive than face-to-face or group-based social learning approaches, and it may play an important role when used *alongside* other strategies and interventions. It has been used by governments or local authorities, particularly in relation to health behaviours, and increasingly in relation to environmental ones. In recent years NGOs have increasingly used and adapted social marketing principles such as framing and market segmentation in their campaigns to change attitudes and behaviours. FOE, Oxfam, and WWF have recently released a report challenging change actors, whether governmental or non-governmental, to focus their campaign and social marketing messages more consistently on activating altruistic

rather than self-interested values as a way of securing deeper rooted transformational change to public attitudes and behaviours (Crompton, 2010).

Because they seek to reach mass audiences social marketing campaigns are often devised and transmitted in a top-down way, in contrast to the bottom-up social learning processes discussed above. Because of this they can be criticized for treating people as consumers of information, rather than active citizens, and thus reducing the potential for social learning. The scale at which they operate also means they are also generally unable to provide tailored face-to-face practical support or address the range of other structural factors that constrain behaviour change. Not surprisingly, some evidence suggests that social marketing approaches are not a particularly effective behaviour change tool when used on their own (Valente and Schuster, 2002; though Mackenzie-Mohr, *op.cit.*, gives a robust account of their potential effectiveness). At local level, the concept of market segmentation can pose a philosophical and methodological challenge to communities: will it be a good idea to segment the members of a geographical community into sub-groups according to their supposed priorities? If there is a strong argument for doing this, how can it be done sensitively, without eroding community spirit or even dividing the community? There is a parallel with the debate on 'streaming' within schools, as opposed to mixed-ability teaching. Arguably, both have their place, but neither works well without careful thought and planning.

As discussed above, community groups have some potential to influence cultural values at local level. Change in what people believe to be possible and desirable is one of the things that we will be looking out for in EVALOC, assessing through interviews and surveys.

5.4 Innovation and diffusion of socio-technical innovations

As suggested above experimental technologies or social innovations that are developed in 'niches' outside the mainstream can be significant in the early stages of system change (Lovell et al., 2009). Communities are a place where new techniques and social practices can be tried, and from which they can spread if they can be seen to work for people (e.g. Rotmans et al., 2001; NESTA, 2010). The hypothesis is that as more communities adopt new technologies and practices, these can become widespread and normal, especially as old systems come under pressure (Geels and Schot, 2007).

Conventional economics suggests that successful innovations will be spread by market forces, but more recent thinking has focussed on the way in which they are spread through social networks. Everett Rogers' 'diffusion of innovations' theory (1995) charts this process. A critical mass is reached, sometimes known as the 'tipping point', when an invention or new practice 'cascades' through society (popularised by Gladwell, 2000). However, there is little evidence that this theory is appropriate for understanding how behaviours will spread spontaneously through society where there is resistance to change, such as reduced flying or eating less meat (Darnton, 2008).

Emerging evidence from the six DECC-funded EVALOC communities suggests that at local level community groups can help increase the uptake of energy efficiency or renewable micro generation, and new energy related behaviours, but this requires considerable, time, effort and resources, and that partnership working with local authorities, or other city wide bodies, can help extend reach and scale. The research will seek to track the extent to which community innovations have spread during the three years of the project.

5.5 Changing policy and widening democratic space

As noted above government policy plays a critical role in influencing energy behaviours and energy use both directly and indirectly. Government can (a) make low carbon products, technologies, services, behaviours cheaper or compulsory, and/or undesirable ones costlier or illegal through e.g. information provision; financial incentives/disincentives such as price signals, subsidies, taxes; regulation (b) provide or coordinate the provision of low carbon goods, infrastructures, services and/or (c) shield low income groups from the negative impacts of higher carbon prices e.g. through equitable tariff structures, or subsidising the provision of energy efficient technologies and micro renewables for low income and vulnerable households.

However, policy change rarely comes about as a result of new evidence alone, as governments are also influenced by range of other factors such as: interest groups/coalitions; public attitudes; expert policy networks; internal institutional pressures such as ideology, short term electoral interests, internal incentive structures, and turf wars; and financial/budgetary constraints (Mayne and Coe, 2010). One model of policy change suggests that change is most likely to come when the policy stream (persuasion), problem stream (public priority) and political stream (ideological battles, power shifts) are aligned (Kingdon, 2003; Parag and Eyre, 2010). A major study of business regulation demonstrated that dialogue, modelling and reciprocation has a surprisingly large influence on policy change (Braithwaite, 2000).

Some general guidelines on advocacy strategy (from Oxfam training manuals, 2010) are relevant for community groups seeking to inform and influence public policy:

- Research and analyse the problem and its root causes, identify what needs to change, and set clear objectives.
- Conduct a power-and-change analysis to identify and prioritise the key factors and actors facilitating and constraining change
- Develop and frame key communication messages for priority change agents and other audiences.
- Design and implement a strategic and sequenced mix of interventions aimed at influencing the priority target actors/audiences e.g. through persuasion (research, dialogue, lobby, partnership working); modelling and/or identifying solutions; pressure (alliance building, media work, and public campaigns). This needs to be complemented by strategies to address hidden and invisible power, strengthen civil society and widen democratic space (Rowland, 1997; Miller et al, 2006).

Developing such comprehensive advocacy strategies is likely to be beyond the reach of many community groups. However, they can play an advocacy role vis a vis local authorities and business at local level, and vis a vis government via national networks and/or campaigning organisations, deploying their resources of 'soft power' (Agyeman, 2003).

We look at the implications of the various internal and external influences for the design of community carbon reduction strategies in Annex 1 below.

6. Implications for EVALOC research design

We look below at some of the implications for EVALOC research design.

6.1 Indicators to categorise and assess community energy interventions

LCCs' effectiveness in achieving changes in energy behaviour is influenced in part by their 'base line' characteristics and in part by their energy reduction strategies, as well as the resources available to them. We categorise the LCC base line characteristics as follows:

Community	Indices of deprivation	Lead agency	Voluntary/paid
Sustainable Blacon	Deprived	Community group	Paid and voluntary
West Oxford	Medium	Community group	Mainly voluntary
Kirklees	Deprived	Council	Mainly paid council/ some voluntary
Hook Norton	Affluent	Community Group	Mainly voluntary
Awel Aman Tawe	Deprived	Community Group	Mainly voluntary
Eco Easterside	Deprived	Partnership charity, community group	Mix of paid and voluntary

Drawing on review findings we propose categorising the design of LCC's energy reduction strategies as follows:

- *Overarching change strategy* – clarity about (a) *what* needs to change – understanding and prioritization of the key influences which need to be addressed; (b) *who* is responsible for guiding and implementing change and role of LCC; and (c) *how* to achieve change – a strategic mix and sequencing of interventions
- *Community engagement strategy* – (a) understanding and mapping of the community (socio-economic make up, social networks and resources); (b) relevance, attractiveness, fairness of 'offer' to community; (c) relevance of messages for different types individuals, tenure, socio-economic groups and/or social networks of residents; (d) efforts to address barriers to participation;
- *Energy reduction strategy* - types, mix and sequencing of energy interventions
 - *Individual, group and/or community level interventions*
 - *Technical interventions (at household and/or community level)* – e.g. energy efficiency, electricity generation and heat production;
 - *Behaviour change/energy conservation interventions (at household or community level)* – e.g. individual or group measurement, practical information/advice, goal setting/commitments, feedback; group or peer-to-peer social learning, norm appeals.
 - *Resource enrolment strategy* – strategy to enrol human, technical and financial resources from outside the community.
 - *Strategies to address wider systemic change* – e.g through partnership working with local authority; networking, mentoring and dissemination strategies with other communities; alliances, movement building, policy influencing.
 - *Group processes* – including learning and feedback integrated into project planning and shared with residents and other stakeholders.

6.2 Indicators to assess impacts of LCCs on energy behaviours, energy use and CO₂ emissions.

Drawing on the literature and analysis above, we suggest that EVALOC tracks and assesses the LCCs' using indicators at three levels, along these lines:

- *Household/individual level* – changes to values, agency (including motivation, skills, knowledge), norms, access to energy efficient technologies/renewable energy sources, energy-related behaviours and patterns of communication (through social network analysis)
- *Community level* – changes to collective capacity (motivation, skills, knowledge), norms, access to energy efficient technologies/renewable energy sources, energy-related behaviours, patterns of communication
- *External level* – socio-technical innovation and diffusion, input into local and national policy, influence on local markets, influence on other communities

Although the main focus of EVALOC research is on energy behaviours and usage, we will also track and assess changes to some socio-economic indicators, as these are likely to have feedback effects on the scale and reach of the energy interventions:

- *Household/individual level* – changes in financial savings, jobs, affordable warmth, health
- *Community level* – assets, jobs, participation in decision making, social capital
- *External level* – partnerships, diffusion of innovations

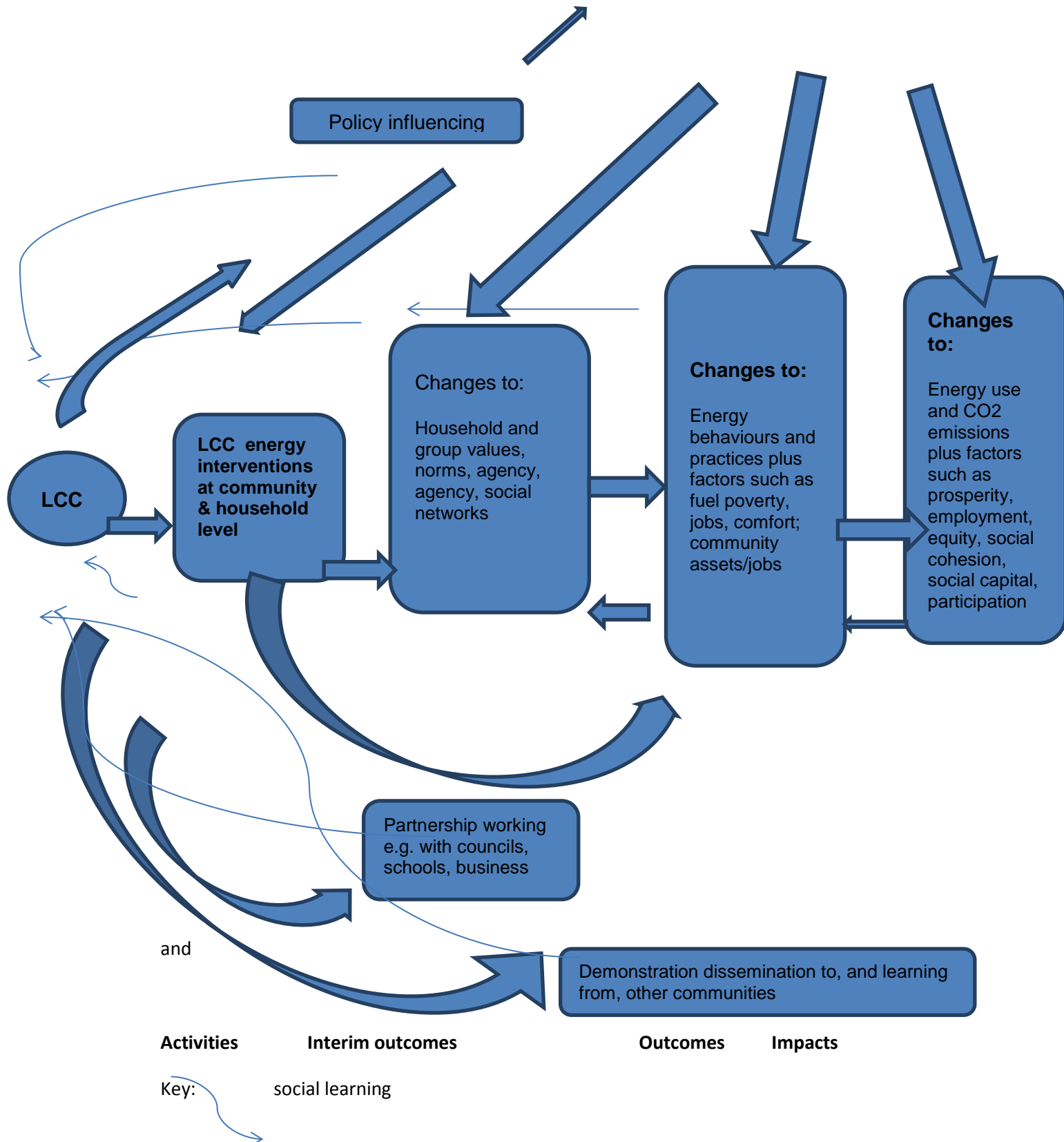
The research will include 'open questioning' in order to pick up issues that are important to community members but may not have occurred to the researchers, as well as to make sure that issues are expressed in the words of respondents, not words that have been put into their mouths.

As this is a collaborative project, there should be some flexibility to assess and include community-specific indicators and questions in the questionnaires, to help test communities' own hypotheses and models of change.

6.3 Proposed research framework for EVALOC

The diagram overleaf outlines a proposed research and evaluation approach. (Detailed indicators and methods of data collection are outlined in the Research and Evaluation Framework).

External/structural influences – (a) government policy framework, incentive structure, provision (b) markets – technology- infrastructure - institutions



7. Conclusions

This review has set out what we see as some of the key issues relating to communities' roles in changing energy behaviours and reducing energy use, recognising that these may change in the course of the research. In doing so, it locates communities role in a wider discussion about what needs to change, who is responsible for change, and how change can be achieved. It warns against some false assumptions, for example the idea that if individuals are presented with enough facts about climate change, or with generalised information, they will change their behaviour. It also provides insights about how community groups can add value to the UK Low Carbon Transition Strategy, by reducing local energy use and by contributing to more systemic change. The review also discusses some of the limits and barriers to community action, for example if there is no initial motivation or capacity to take action and the difficulty of addressing external/structural influences on energy use. The EVALOC research programme will explore these and related questions, for example: what is a community? how much is it a reality on the ground? who talks to whom? what different interest groups and 'communities of interest' make up a LCC, or overlap with it? what happens if there is no community organisation? what messages and engagement methods work well? when is it a good idea for community groups to segment their community; and when is it best to adopt the same approach for everyone? what mixes and sequences of interventions are effective?

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Annex 1: Implications for the design of community low carbon interventions

Influences on energy use	Possible change interventions
Addressing individual/internal influences on energy behaviours/use	
Information, incentives, knowledge and patterns of thinking, values, beliefs and attitudes, social norms and agency	<ul style="list-style-type: none"> • messages and interventions delivered by a 'trusted' and 'attractive' messenger • messages tailored to concerns, needs and identities of different audiences and socio-economic groups • messages framed to 'activate' altruistic' as well as 'self-interested' values relating to personal benefits • provision and/or signposting of (a) clear and appropriate information and advice to simplify choices and assist individuals' decision making • (b) economic incentives/subsidies and energy efficiency and (c) low carbon technologies • practical (ideally tailored and face-to-face) advice and support to increase individual agency (knowledge, skills, confidence) and make change easier • use of 'norm appeals' to influence behaviours • energy feedback through monitoring of energy bills or meters, carbon foot printing, energy display monitors to raise energy awareness and increase the visibility of energy use. • encouraging people to make public commitments and/or goal setting to help turn intentions into actions • repeated prompts and/or interventions at convenient times (e.g alongside home improvements) to help break habits. • space for people to explore the cultural, social and meanings relating to climate change, lifestyles and practices. • cycles of action, reflection and action, feedback to enable individual learning and strengthen individual agency.
Addressing group/community influences on energy behaviours/use.	
Group/community standards/rules, and collective capacity	<ul style="list-style-type: none"> • use of inclusive communication and engagement methods including diffusion through social networks • group/collective projects to enable people to interact with others and hence (a) model and learn new behaviours (b) build new social norms and (c) increase their sense of individual motivation and agency • processes of group reflection and learning (e.g through action research) to create new group norms, enable group learning and strengthen individual and group capacity. • provision of practical capacity building • monitoring and providing energy and other feedback to residents about the community's CO2 reductions and related social and economic changes to increase motivation.
Addressing external influences on energy use and behaviours	
Economic influences (prices, incomes); technologies and	<ul style="list-style-type: none"> • enrolment of external resources/skills and developing partnerships to extend reach and impact • dissemination strategies to diffuse socio-technical innovations e.g. through social networking; peer to peer mentoring;

infrastructures; socio-economic structures; institutional practices; cultural values; public policy	<ul style="list-style-type: none"> • partnership working to increase reach and scale e.g with local authorities • policy influencing/advocacy by building alliances with other communities and organisations to help inform and shape government policy • social marketing, education, media and NGO campaigns to influence cultural values and change institutional practices and incentives that foster pro- environmental behaviours.
Addressing interactions and cross cutting influences on energy use and behaviours	
	<ul style="list-style-type: none"> • adopting integrated approaches based on elements above • implementing and/or advocating for inclusive approaches which distribute responsibilities, benefits and costs fairly; address barriers to participation e.g. relating to time, cost, agency, childcare, identity, language, location etc. and address constraints e.g through individual and group empowerment and capacity building, and redistributive policies and programmes.
The community group invites and encourages the whole community to participate in the programme (and complementary projects) through a range of general and targeted communication and engagement methods (as above)	
Groups standards and behaviours change through social learning (modelling, observation, and interaction with other residents in group and community settings)	

Annex 2: some multifactorial behaviour models

A number of multifactorial and integrated behaviour models have been developed to take into account the range of variables that affect behaviour. Some of these models have been criticised for introducing so many variables that it becomes difficult establish meaningful correlations between variables, or to identify causal influences on choice (Jackson 2005). Some examples of the simpler and more relevant models are included below. The examples are drawn from Jackson's and Darnton's behaviour change reviews. (Jackson, 2005 and Dartnon 2008 a).

Triandis' (1977) early model of interpersonal behaviour posits that in any particular situation an individual's behaviour is partly a result of intent, partly habitual responses and partly the situational constraints and conditions under which they operate.

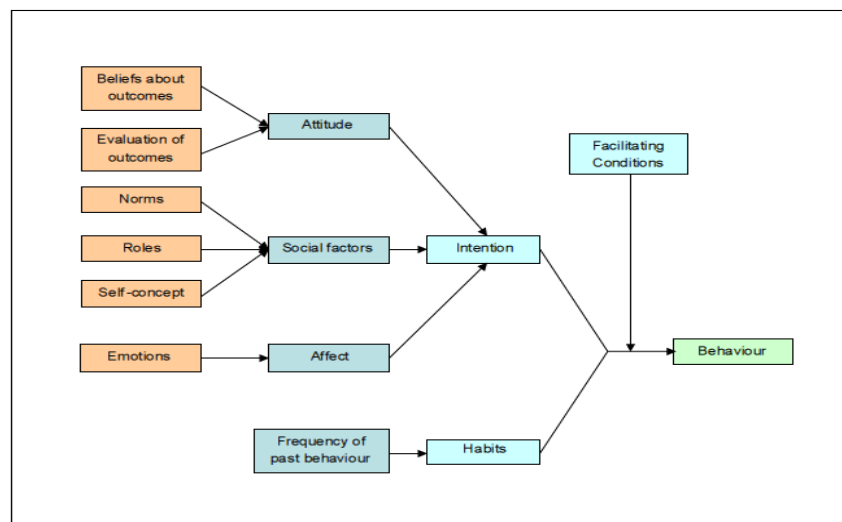


Figure 2.12: Triandis' Theory of Interpersonal Behaviour (TIB), (1977) [reproduced from Jackson 2005]

The Needs Opportunities Abilities (NOA) Model (Vlek et al., 1997) is an example of a societal model that the different levels of behavioural influence (quoted in Darnton 2008, p 32) It includes an intention based social-psychological model of individual consumer plus five macro-level societal factors – Technology, Economy, Demography, Institutions, Culture – that shape consumption. The model shows consumer behaviour influencing societal factors, by means of a large feedback loop running from the bottom to the top.

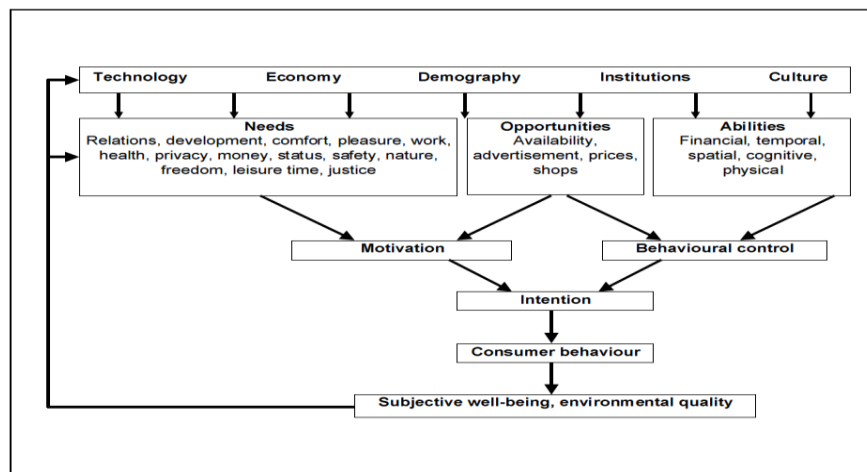


Figure 2.15: Vlek et al's Needs Opportunities Abilities (NOA) Model (1997)

The Energy Cultures framework (Stephenson et al., 2010)

proposes that consumer energy behaviour can be understood by examining the interactions between:

- cognitive norms e.g. beliefs, understandings, motivations. At household level this may include social aspirations, expected comfort levels, environmental values and respect for tradition.
- material culture e.g. heating technologies, building form. At household level this may include heating devices, house structure, and insulation.
- energy practices. At household level this may include temperature settings, hours of heating, and maintenance of technologies.

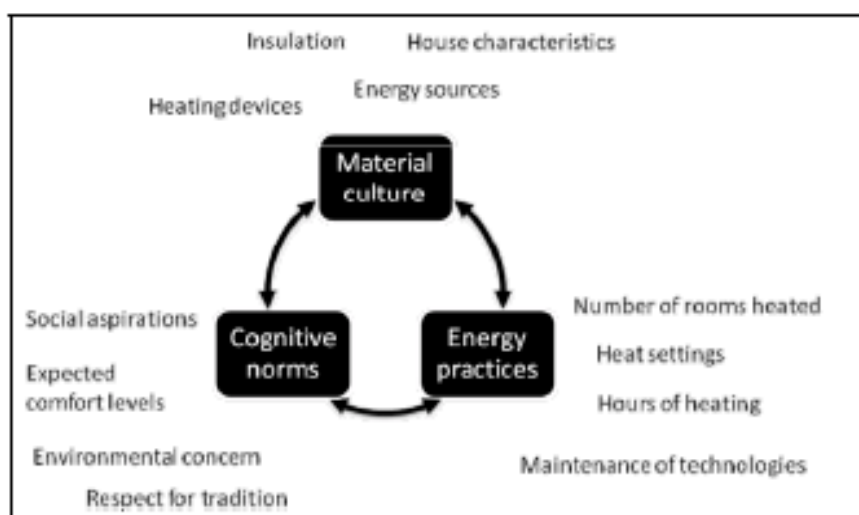


Fig. 2. Using the Energy Cultures framework to depict some of the wider systemic influences on behaviour.

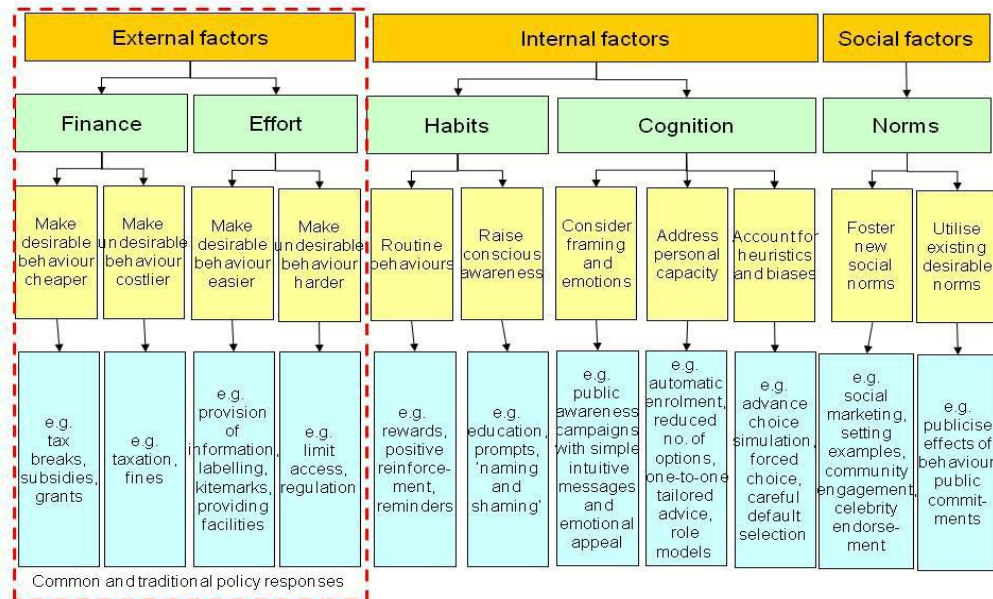
Each of the three components (cognitive norms, material culture and energy practices) individually affects energy use, yet they are also strongly interactive. For example, the existence of a heat pump (material culture) will result in very different practices from a household with an open fire; a frugal upbringing (cultural norms) will impact on energy practices and possibly on the choice of technologies (material culture).

Annex 3: Some intervention frameworks

The following intervention frameworks are drawn from Darnton's behaviour change review (2008 a).

Creatures of Habit? The Art of Behavioural Change (Social Market Foundation, 2008)

Figure B - SMF behavioural economics approach



Gardner and Stern's principles for intervening to change environmentally destructive behaviour (1996)

A Use multiple intervention types to address the factors limiting behaviour change

1. Limiting factors are numerous
2. Limiting factors vary with actor and situation, and over time
3. Limiting factors affect each other

B. Understand the situation from the actor's perspective

C. When limiting factors are psychological, apply understanding of the human choice process

1. Get the actors' attention; make limited cognitive demands
2. Apply principles of community management (credibility, commitment, face to face communication etc.)

D. Address conditions beyond the individual that constrain pro-environmental choice

E. Set realistic expectations about outcomes

F. Continually monitor responses and adjust programmes accordingly

G. Stay within the bounds of actors' tolerance for interventions

H. Use participatory methods of decision-making

Defra's model, 'Enable, Encourage, Engage and Exemplify' (the '4 Es' or 'Defra Diamond')

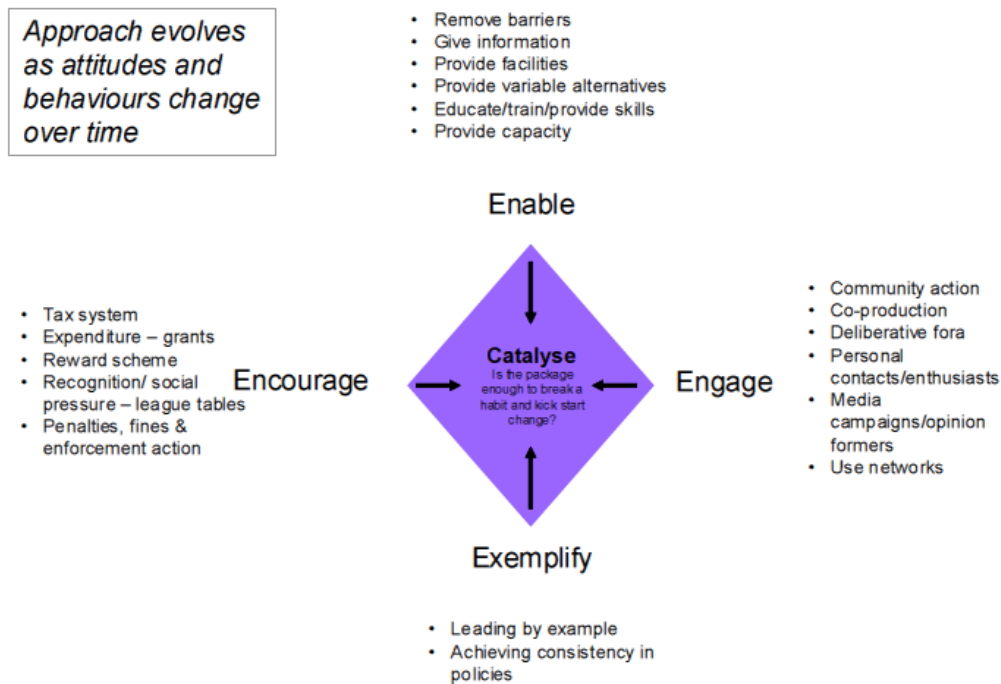


Figure 5.31: Defra's 4 Es Model (2005)

In the Ippr's adapted version of the model (in Lewis 2007), it is notable that 'Encourage' appears as 'Encourage and Enforce', emphasizing government's potential to compel behaviour change in some circumstances. The model covers a wide range of influences but is open to criticism on the grounds of failing to take into account the often contradictory influence of government policies or market forces.

The Cultural Capital Framework

This framework has expanded the boundaries of the 4Es model by setting it in the wider context of culture change (Knott et al., 2008), so policymaking for individual behaviour change sits within wider policy making for culture change.

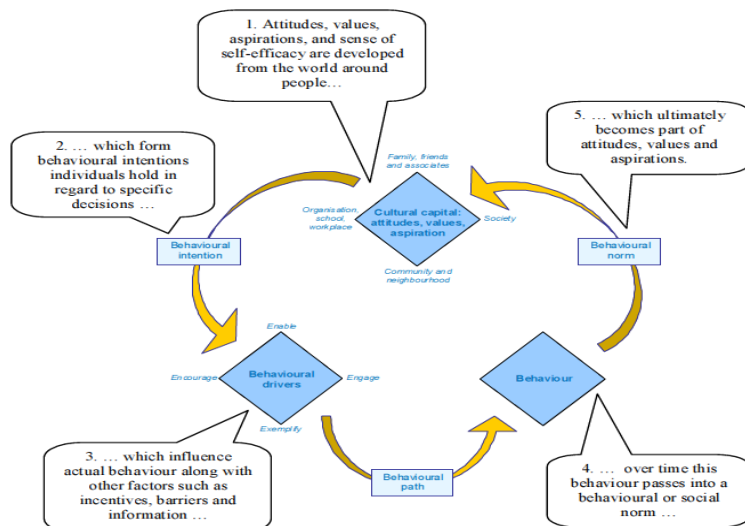


Figure 5.32: Knott et al's Cultural Capital Framework (2008) [reproduced from Knott et al 2008]

The Department for Communities and Local Government model of community empowerment (CLG 2008 – Figure 5.33).

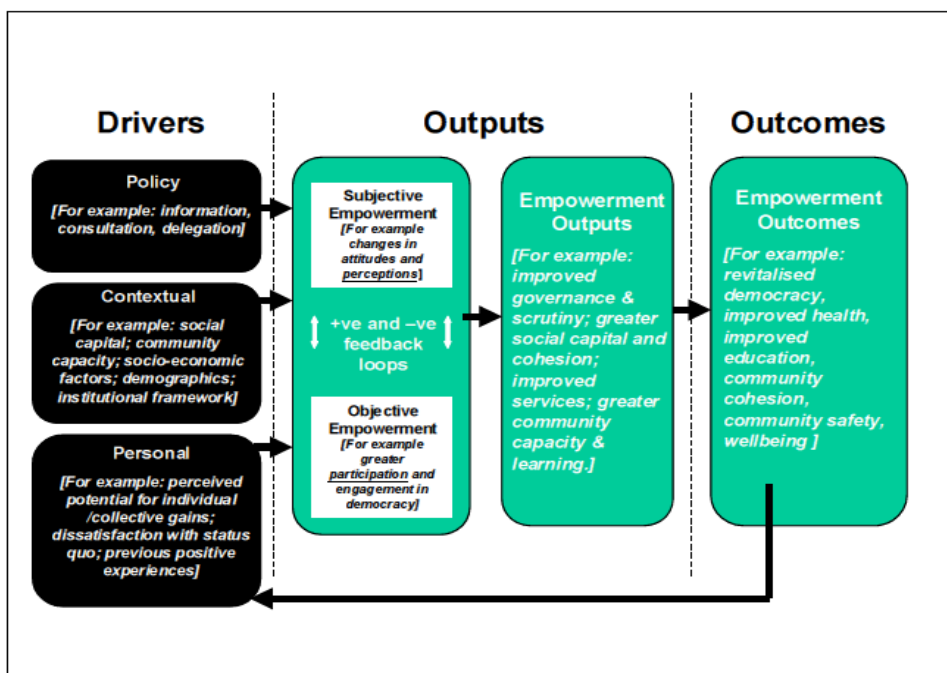


Figure 5.33: Department for Communities and Local Government's Community Empowerment Framework (2008) [reproduced from CLG 2008]

This model serves both as a policy framework and a model of change. It shows the recursive relationship between policy intervention and individual behaviour in generating community empowerment; we may recall the discussion of social capital. While the model serves to identify the factors driving community empowerment, it also demonstrates the role of policy in bringing about societal change. However policy is limited to information, consultation and delegation, and not regulatory framework and incentive framework.

Stages of Change

A widely used change model is Prochaska and Di Clemente's 'Stages of Change' model, developed to help people break away from addictions (see Di Clemente and Prochaska, 1994 for a full account). The model is based on a cycle of behaviour change and has been widely used, particularly in health interventions. The model is basically a segmentation, which arranges people on a continuum according to the stage of change they are judged to have reached. This has recently been converted by WWF & CAG Consultants Ltd into a tool to evaluate sustainable change.

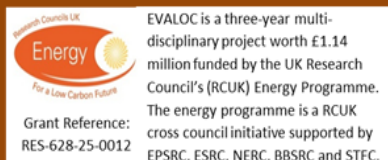
- **Pre-contemplation** – a person has not yet decided that the change you are proposing is relevant to them.
- **Contemplation** – something happens to prompt a person to start thinking about a possible change, but they are still not committed to that change.
- **Action** – a person begins to plan a change. They may be learning new skills and finding out information.
- **Maintenance** – the change has been integrated into the person's life, it is lasting and well-practiced. At this point we exit the cycle entirely, or we may go into:
- **Lapse or relapse** – either temporary or permanent reversion to the pre-change behaviour.

Evaluating the change process does not ask people to count things like how many miles they drive or how many cans they recycle. Instead, it assesses where participants are on a cycle of behaviour change, in order to see how far they have travelled along their journey.

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