# Low-carbon communities as a context for individual behavioural change

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## ARTICLE INFO

## ABSTRACT

Previous attempts to change energy-related behaviour were targeted at individuals as consumers of energy. Recent literature has suggested that more focus should be placed on the community level and that energy users should be engaged in the role of citizens, and not only that of consumers. This article analyses different types of emerging low-carbon communities as a context for individual behavioural change. The focus is on how these communities offer solutions to problems in previous attempts to change individual behaviour. These problems include social dilemmas, social conventions, socio-technical infrastructures and the helplessness of individuals. Different community types are examined, including geographical communities as well as sector-based, interest-based and smart mob communities. Through four case studies representing each of these community types, we examine how different communities reframe problems on the individual level to reduce carbon emissions. On the basis of an analysis of the strengths and weaknesses of various community solutions, implications are drawn for further research and for the design and support of low-carbon communities.

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## 1. Introduction

For decades, attempts to change energy-related behaviour were targeted at individuals as consumers of energy. Recently, many European localities have started to transform themselves into sustainable energy communities or low-carbon communities. Here, individuals take the role of citizens rather than consumers, and gain the capacity to work together to transform their energy infrastructure on the local level (Raven et al., 2008).

Low-carbon communities provide a new context for energy end-user behaviour change (Middlemiss, 2008). Thus, they present potential solutions to key problems in early energy demand-side management programmes (see Wilhite et al., 2000). According to Gardner and Stern (1996), there are basically four types of instruments to change behaviour in relation to environmental problems: regulations and incentives; education and awareness raising; community management of environmental resources; and reference to moral, religious or ethical principles. In European societies, the first two types are used almost exclusively, and in the case of energy consumption, with little success.

Energy conservation programmes have suffered from an overly individualistic focus, assuming that individuals fully control their behaviour and make decisions in isolation (Lutzenhiser, 1993; Wilhite et al., 2000; Jackson, 2004). Research has shown that this is not the case. Individual decisions to save energy in order to conserve common natural resources are framed by social dilemmas (Kollock, 1998): individual efforts are useless unless others participate. Moreover, energy-related behaviour is shaped by conventions and socio-technical infrastructures that are largely beyond individual control (Shove, 2003; Guy, 2006). Finally, these problems, together with the invisibility of the consequences of our action, lead to a sense of disempowerment that is a major obstacle to low-carbon lifestyles (Thøgersen, 2005). Low-carbon communities present at least a partial solution to these problems of individual behaviour change.

Most of the discussion on low-carbon communities centres on geographically local communities (e.g. Shackley et al., 2002; Smith, 2007; De Witt, 2008; Peters and Fudge, 2008; Saastamoinen, 2009). This is indeed one of the primary forms of community with a place-based identity, shared history, shared infrastructure, and political and administrative power. We introduce into the discussion some other forms of community: sector-based communities, interest communities and virtual communities. We thus define low-carbon communities as forms of co-operation and collaboration that aim to reduce the carbon intensity of their members' lifestyles by providing amenable contexts and mechanisms that encourage behaviour change (see Middlemiss, 2008). By analysing

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various low-carbon communities, we examine which problems of individual behaviour change they solve best, and in which way. Our research is exploratory in nature, and aims to identify potential solutions than can be confirmed in later research.

This article is structured as follows. We first present low-carbon communities as a potential solution for four persistent problems in energy demand-side management: social dilemmas, social conventions, shared infrastructures and the helplessness of individuals when faced with the enormity of climate change. We then examine how these issues are addressed in present-day low-carbon communities, drawing on a dataset from an ongoing project called CHANGING BEHAVIOUR, funded by the European Commission's 7th Framework Programme. We analyse the strengths and weaknesses of various community types, and conclude by suggesting avenues for further research and development.

## 2. Changing behaviour: the fallacy of targeting individuals

Most of the behavioural change programmes to reduce energy consumption, and more recently to reduce the carbon intensity of our lifestyles, have focused on individual behaviour. They have tried to influence behaviour via economic instruments like grants and rebates, or via education and persuasion, e.g. information campaigns (Geller et al., 2006). While some programmes have been quite successful (Geller et al., 2006), many have faltered, leading to scepticism about the possibilities to change current high-energy, high-carbon behaviour patterns. Considering the remaining cost-effective potential to reduce $CO_2$ emissions (e.g. Urge-Vorsatz and Novikova, 2008), especially through energy efficiency and energy conservation (ESD, 2006; IEA, 1998), the current results of behavioural change programmes appear modest.

Many of the behavioural change programmes suffer from a conceptual problem: methodological individualism. By drawing on purely economic or psychological representations of behaviour, they fail to recognize the socially grounded nature of human behaviour (Wilhite et al., 2000; Biggart and Lutzenhiser, 2007). In the following, we elaborate on four issues in adopting low-carbon behaviours that are disregarded when focusing merely on individual behaviour. To conclude, we suggest some features of communities that can influence their capability to address these problems.

### 2.1. Social dilemmas

The notion of social dilemmas in natural resource use is grounded in the problem of public goods (e.g. Hardin, 1968). Public goods are goods for which property rights are not defined, and which can be freely used by anyone (e.g. shared natural resources like the atmosphere). Thus, there is no mechanism to limit overuse and depletion of the resource. Even when individual users perceive the problem of overuse, their unilateral actions to limit use are ineffective if others continue the unlimited use of the resource. While economists originally suggested the allocation of property rights as a solution to this problem, this is not often feasible or desirable (Ostrom, 1990).

When we try to solve collective problems like climate change by focusing solely on changing individual behaviour, social dilemmas arise (Kollock, 1998). Unless people can assure themselves that others are contributing, their efforts to reduce the carbon footprint of their personal behaviour may appear pointless. This dilemma is reflected, for example, in a recent survey in which 57% of the respondents stated that they 'do what they can for the environment', but it does not make a difference because 'other citizens' or 'large polluters' do not do so (Eurobarometer, 2005).

Recent guidelines for behavioural change campaigns have acknowledged this problem and stressed the importance of making sure that everyone is participating and that people see that others are also 'doing their bit' (Olli et al., 2001; Lucas et al., 2008). More fundamentally, community management (i.e. management of resources by the entire community rather than by individuals) could be a solution for the dilemmas of the sustainable consumption (Gardner and Stern, 1996; Jackson, 2005).

While community management presents a promising approach to social dilemmas, mere close interaction with others within a community is not sufficient (e.g. Brint, 2001). Ostrom (1990) has identified features of traditional communities that have successfully managed shared resources sustainably, including clearly defined governance *boundaries*, *rules* concerning the utilisation of resources, collective choice *agreements*, *monitoring*, *graduated sanctions*, *conflict-resolution mechanisms*, and the ability to *self-organise*. Such features are notably lacking in today's world of energy use and carbon emissions. Yet, at various levels, groups of individuals can create new institutions and schemes for resolving social dilemmas. For example, Kollock (1998) has argued that *transformation* is a promising avenue to resolve social dilemmas: collective action can be reframed by providing assurance that others will co-operate, signalled through pledges and common symbols.

### 2.2. Social conventions

Social dilemmas are not the only obstacle to converting to a low-carbon lifestyle. Individually oriented behaviour change programmes have been shown to disregard the social nature of behaviour (Wilhite et al., 2000). It is implicitly assumed that each consumer makes decisions about consumption in isolation, and is free to choose products and services on the basis of personal preferences.

Research on the evolution of consumption patterns has shown that individual choice has a limited role in many types of environmentally relevant behaviours (Wilhite et al., 2000). For example, Shove (2003) has examined the development of washing and bathing, showing how commonly shared conventions of cleanliness and 'freshness' have increased the frequency of both activities over the past decades. Similarly, the demand for 'convenience' products has grown as the temporal organisation of family life has disintegrated: families rarely go to work at the same time, eat at the same time, and spend their leisure time in the same place. Such conventions relate to the mutual ordering of everyday life across individuals. They are not primarily individual choices: consumption patterns are shaped by shared conventions that evolve historically, creating common understandings of decency and appropriate behaviour (Cowan, 1983).

Conventions are learned and maintained through social interaction. They are reinforced by a vast commercial system of technologies, marketing and media that contribute to a convergence of conventions of "comfort, cleanliness and convenience" (Shove, 2003). It is thus difficult for individuals to step outside conventional systems of consumption. It is even difficult to perceive the 'conventional' nature of self-evident and 'normal' customs. Even if they are called into question, the renouncement of 'conventional consumption' (such as frequent showering or laundering) is easily perceived of by others as anti-social. As conventions are by definition socially shared, one solution is to support new social groups that collectively develop alternative conventions (Ornetzeder et al., 2008). Moreover, if we want to question existing conventions, a deliberative and inclusive process of problematising current lifestyles is needed (Tukker et al., 2008).

## 2.3. Lack of infrastructure

The evolution of consumption patterns, conventions and customs is closely linked to the development of technologies of everyday life (Røpke, 2006; Shove, 2003; Gram-Hanssen, 2008). For example, Shove (2003) has shown how air conditioning systems have evolved through mutually reinforcing developments in scientific specifications of 'comfortable' living and working temperatures, building design and workplace practices. While air conditioning standards have converged around the world, alternative schemes for 'making oneself comfortable' have been marginalized (Guy and Shove, 2000; Chappels and Shove, 2005). Even though conventions and socio-technical systems are two sides of the same coin (Shove, 2003), it is worth addressing infrastructures separately as their materiality requires specific resources for change.

The above is only one example of the socio-technical systems that shape the carbon intensity of our lifestyles. Such systems only become visible when the problems created by them are acknowledged in society. Even then, the unavailability of alternative systems creates barriers to change. And even when technologies like low-energy housing constructions become available, they are difficult to adopt because of the lack of supporting competencies, services, and social structures. High-carbon technologies are linked to broader systems of supporting knowledge structures, supply chains, commercial interests and conventions (Guy and Shove, 2000)—what many scholars of technological change call 'regimes' (Verbong and Geels, 2007). Such regimes are embodied in urban infrastructures of electricity, water, waste and other utilities (van Vliet et al., 2005) as well as in the available routines, knowledge and skills of how to conduct one's daily life.

Thus, shifting to low-carbon lifestyles often requires a questioning and search for alternatives, not only for existing conventions, but also for existing infrastructures of consumption and work. It is obvious that changes in entire infrastructures are beyond the purvey of most individuals; they are collective endeavours. While socio-technical systems and infrastructures are national or even global, they are also partly amenable to local modification and experimentation. Sustainable housing areas and alternative utility systems are some examples of current experiments in creating new infrastructures of consumption (van Vliet et al., 2005; Ornetzeder and Rohracher, 2006).

Because infrastructures are central in defining the carbon intensity of modern lifestyles, they are also central in supporting and maintaining change. Even though individuals can be induced by information or incentives to 'go against the grain' and learn to curtail energy consumption, such changes are often short term and rarely survive once the change interventions are discontinued (Kurz, 2002; Abrahamse et al., 2005) For lasting change, individual learning needs to be supported by new routines, infrastructures, institutions and networks (Bijker et al., 1986; Rohracher, 2001).

## 2.4. Helplessness

The previous paragraphs show that individuals are locked-in to existing consumption patterns through many social and socio-technical ties (Sanne, 2002). Thus, exhortations to individuals to 'take responsibility' may be frustrating and create a feeling of helplessness (Cleveland et al., 2005). The small things that are easy for individuals to do may be relatively useless in the face of the enormity of climate change. Psychological theories of individual level change have discussed empowerment as a key factor supporting behavioural change; a feeling of helplessness is the greatest obstacle to change. People are most motivated to change when they feel they are becoming more competent and more able to take charge of their lives (De Young, 2000; Kaplan, 2000).

Helplessness and disempowerment can be countered by providing individuals with feedback on the collective impact they are making in reducing carbon emissions (Tukker et al., 2008). Feedback is an important aspect of empowerment because the problem itself is invisible, and people have no way of knowing whether they are making a difference. Moreover, they have no way of knowing whether others are participating, and hence collectively making a *significant* difference.

A further solution suggested to empower individuals is to align intrinsic and extrinsic motivations (Kaplan, 2000; Corbett, 2005), referring to intrinsic motivations that relate to resource conservation as an end in itself, and extrinsic, i.e. ulterior motivations like cost savings and personal benefits (see Kasser, 2003). People need to feel their efforts are making a difference, and require government support for this. However, if the support is too directive it can undermine the intrinsic motivation (Thøgersen, 2006). Thus, empowerment cannot be accomplished top–down—'being told what to do' can engender even more helplessness (Kaplan, 2000). Individuals need to be invited to participate in devising their own solutions. Moreover, incentives should be aligned to support individuals' voluntary efforts (Thøgersen, 2006).

These observations suggest that low-carbon communities can support individual empowerment in different ways. From the individuals' perspective, collaboration in a community may counter helplessness and help to empower individuals by providing a feeling of competence, feedback on the impacts of their and others' actions, and a 'voice' in devising solutions.

## 2.5. Features of communities that may influence their capacity to facilitate low-carbon lifestyles

Above, we have suggested a number of ways in which low-carbon communities might be more or less effective in solving the problems faced by individuals when attempting to reduce the carbon intensity of their lifestyles. On the basis of the literature, we assume that the rules and characteristics mentioned by Ostrom (2000) and the ways of solving social dilemmas suggested by Kollock (1998) may be relevant for low-carbon communities, but we also expect that there may be additional relevant features not mentioned in these sources.

We can also consider, following Jackson (2005), the influence of more structural features of communities on their capacity to facilitate change at the individual level. This notion draws on a set of concepts from Cultural Theory, the grid-group matrix (Douglas and Wildavsky, 1982), closely corresponding to the classical forms of social structure "Gemeinschaft" and "Gesellschaft" as defined by Tönnies and Durkheim. "High grid" refers to a social structure in which the rules governing social relations are clearly defined, and there is a clear division of labour within the community. "High group" refers to a structure in which the boundary between the community and the outside is distinct and group members share strong personal and emotional ties.[1] We expect that the structure of low-carbon communities can have an impact on their effectiveness in solving the four different kinds of problems mentioned above. In particular, we expect that the structure of communities can influence their capacity to shape infrastructures, on the one hand, and empower individuals, on the other.

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[1] These two dimensions produce the basic forms of social structure, with different ways of dealing with risks like climate change. A community with 'high grid' and 'low group' is typically individualist, whereas a community with 'high group' and 'low grid' is typically egalitarian. 'High grid' combined with 'high group' produces a hierarchical structure.

## 3. Four types of low-carbon communities

Above we have discussed four barriers to behavioural change that call for solutions at the community rather than the individual level. Low-carbon communities may help to solve some of these problems. However, the problems transverse geographical community boundaries—they occur on multiple scales, and the most appropriate scale and format for their solution is still an open question (Jackson, 2005).

Most of the discussion on low-carbon communities focuses on place-based communities like cities, municipalities or neighbourhoods (Hodson and Marvin, 2009). Sectoral networks are another type of community addressing climate change. NGOs, especially ones that combine a campaigning mission with an aim to provide services for members are another form of community that can be termed 'interest-based'. Today, virtual communities like 'smart mobs' (action groups organising via social media technologies, see Rheingold, 2005) are also emerging to promote more low-carbon lifestyles. In the following, we present one example of each type of community.

### 3.1. Urban community: Manchester is My Planet

Manchester is My Planet (MiMP) is a city-regional partnership programme aimed at transforming the level of action on climate change by local authorities, universities, businesses and citizens. Co-ordinated by Manchester: Knowledge Capital (M:KC), the programme includes a behavioural change work stream spearheaded by a Climate Change Pledge Campaign encouraging citizens across Greater Manchester to reduce their $CO_2$ emissions by 20% by 2010.[2]

In 2005, an initial MiMP feasibility study identified a climate change pledge campaign as a potential way to build receptivity and support in the community for the changes needed to move towards a low-carbon economy. Funding was secured from the UK Department of Environment, Food and Rutal Affairs (DEFRA) to design and initiate the pledge campaign and pilot new national best practice guidance from Futerra/DEFRA (2005) entitled 'Rules of the Game'. The design of the campaign sought to target mainstream public opinion in a positive and inclusive way, and utilise a network of over 100 partner organisations who had been engaged in the design of the wider MiMP programme. The involvement of partner organisations in the campaign gave access to employees through customised staff e-mails, newsletters and events. It also helped to engage partner organisations in delivering a practical 'quick win' and build momentum and commitment to the programme.

The main thrust of the campaign was to encourage a wide spectrum of citizens to make a personal commitment to reduce their own $CO_2$ emissions and feel part of wider 'movement' of personal, social and organisational change. In this way the programme sought to challenge the social convention that action on climate change was purely the responsibility of government or traditional environmental activists. The aim was to address three key motives to mobilise participation:

1. *Alignment with a mainstream, 'cool and fun' campaign*: This was done by using upbeat, independent branding. All the messages employed aimed to be positive, inclusive and empowering. The events targeted to gain new pledges were either festivals, sporting events or other leisure activities. The use of celebrities from sport and television was central to this 'fun and cool' image. Political endorsement was sought from both national and local figures to provide gravitas to the campaign.

2. *Saving money*: The personal financial benefits of reducing energy use were employed as a campaign message demonstrating the personal benefits of taking action.
3. *Empowerment to reduce the impacts of climate change:* This was done by showing how personal actions can reduce $CO_2$ emissions and demonstrating that residents could take positive local action in tackling the global issue of climate change.

After the initial two-month period of intensive public relations and marketing, which yielded over 10,000 pledges, co-ordination of the campaign passed directly back to M:KC. With further funding from DEFRA, a communications programme was established with the pledgees. This took the form of newsletters, e-bulletins, online resources and local authority-led events. Promotion of the energy saving advice services of partner organisations formed a key part of the message, giving pledgees the information to take action themselves. Moreover, the campaign established 'affinity deals' with environmental companies (solar thermal system manufacturers, car-club organisations, green electricity providers, etc.) prepared to offer discounts in return for promotion to the pledgees. This helped to demonstrate that being part of MiMP brought tangible benefits to those involved.

Progress on the wider MiMP programme and pilot projects was communicated to pledgees and wider stakeholders to demonstrate that their efforts were being matched by politicians and partner organisations. As communications funding drew to a close, viral communication methods[3] were developed with low-cost methods such as a Facebook (social media) application, film introductions and climate change speaker training courses.

The primary metric for judging success of the campaign remains the number of pledgees that currently stands at over 20,500. This makes it the most successful sub-national pledge scheme in the UK. While communicating the message that citizens have a part to play in tackling climate change, the fact that there are more than 20,000 confirmed pledges demonstrates to politicians that a significant constituency support ambitious city-regional leadership on climate action. The pledge campaign was always conceived as a short-term injection of activity to generate the support and demand for mainstream resources required to deliver the major long-term changes needed to develop a low-carbon economy.

There are also other mechanisms in place to move Manchester along the path to a low-carbon future. MiMP is closely linked the overall programme of urban regeneration in Greater Manchester. Efforts are underway to encourage a shift to low-carbon transport, to create low-energy business and administrative facilities, to increase the use of wind power in the area, and to stimulate the emergence of energy service companies (ESCOs). Moreover, new institutions are being set up, such as the Greater Manchester Climate Agency. In principle, this urban area of 2.5 million inhabitants has significant opportunities to create new low-carbon infrastructures, as well as to shape the conventions governing present-day urban life.

### 3.2. Sector community: Green Office

Green Office is a programme run by WWF Finland to promote low-carbon workplaces and lifestyles.[4] It is not primarily a community, but a certification and training programme, yet it employs community building among the participating

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[2] For more details, see Robinson (2009) and Manchester Knowledge Capital (2008).

[3] Viral communications exploits existing social networks by encouraging customers to share information with their friends (see e.g. Leskovec et al., 2007).
[4] For more details see Heiskanen (2009).

organisations. The networking and communal aspects of the programme are one if its central success factors.

Green Office offers a simplified environmental management and certification system, with a special focus on $CO_2$ emissions. The ultimate goal of the programme is to combat climate change through energy efficiency and renewables, reduce natural resource use and promote sustainable lifestyles through enhanced employee awareness. Currently, 200 offices with a total of 20,200 employees have gained the Green Office certificate. Certification requires that offices appoint staff responsible for the Green Office programme, setup an environmental programme, provide training, sort and recycle waste, reduce $CO_2$ emissions, make a commitment to continual improvement, monitor achievement of objectives, and report annually to WWF Finland. Other support activities include training sessions and regular e-mails with conservation ideas. Studies are published on best practices and WWF representatives make regular inspections of certified offices. Reasons for offices to adopt the scheme include environmental benefits, cost savings, staff motivation, enhanced reputation and legitimacy of the certified organisations.

While Green Office is not primarily a community but a certification scheme, it makes extensive use of some community management principles:

- Networking among the participants is a core element of the programme. WWF Finland organises four network meetings annually, hosted on a rotating basis by the participating offices. Each network meeting has a specific theme (e.g. energy use of office IT). Invitations are sent to the Green Office contact persons, and they invite the relevant people from their organisation. These network meetings are important for learning and information exchange.
- Commitment is an integral element of the scheme. It is ensured by the contract signed between the participating offices, through annual inspections and via the required reporting. Companies not meeting these criteria are excluded from the programme. Commitment within the participating organisations is ensured by appointing Green Office contact persons—usually consisting of a Green Office team with members from different organisational functions.
- The programme makes use of social pressure and social recognition. Often the initiative to join the scheme comes from one of the employees or from a mid-level manager. There are also diffuse pressure from customers and prospective employees who want to work with a 'responsible company' that 'cares for the environment'. Green Office is a simple way for organisations to respond to these diffuse pressures by adopting an easy-to-use system. Social pressure and emulation has also been employed by WWF Finland in having 'admired' and well-known companies as participants in the scheme, serving as role models for prospective participants.

The programme has been successful in reducing $CO_2$ emissions. For example, in 2007, the Green Office participants reduced their $CO_2$ emissions by 12%. Most of this reduction, however, is achieved via reduced paper use and a shift to green electricity. Reductions in energy consumption have been more modest. Many offices have achieved energy savings through simple measures like turning off computers and lights, but this is not always sufficient to offset the growing demand for energy for new office equipment, especially increasingly powerful servers. Going beyond 'the low-hanging fruit' requires fundamental changes in the infrastructures of office work provided by global suppliers and based on global standards. Thus, the engagement of suppliers like IT manufacturers and facility managers is an ongoing challenge.

On the other hand, the programme has been successful in creating new networks and a sense of community. The Green Office companies interact with each other regularly and share experiences. Being part of this 'club' seems to be an important motivator for the participants. Additionally, new business partnerships have built up from within the network to supply energy-efficient solutions. As the participating offices join forces to question existing practices (such as distributing information on paper), they also work to reshape the conventions governing office work.

Green Office serves to align some of the intrinsic and extrinsic motives of the organisations participating in the scheme, as it offers a win–win proposition. The scheme also goes some way toward empowering individual employees, many of whom would like to do more, but often lack the requisite skills, knowledge and powers. Green Office empowers these intrinsically motivated employees by providing competencies and a legitimate context for environmental improvement. Other employees are not equally motivated, but the feedback provided on the effectiveness of their efforts serves to alleviate some of their concerns. However, the extent to which Green Office really serves the individual employees' interests depends on the management style of each participating organisation—Green Office itself does not deal with employee empowerment.

### 3.3. Interest community: Carbonarium

Carbonarium is both the name and programme of a not-for-profit and non-governmental association in Hungary established in early 2005 with the overall aim of decreasing its members' $CO_2$ emissions and also increasing climate change awareness of the general population. The members of the association keep track of their own $CO_2$ emissions, compare them with one another, implement mitigation measures, and pay membership fees based on their calculated $CO_2$ emissions.[5]

The programme is rather ambitious as it builds on its members' sense of responsibility and voluntary initiative in cutting consumption and related emissions. They do this in a country where there is no supporting infrastructure or any funding easily available for such initiatives.

The aim of the association is to *create a voluntary community* of its members who believe that it is their responsibility to reduce the $CO_2$ content of the atmosphere, accepting at the same time that the increase in atmospheric $CO_2$ concentration is a global problem. Members are aware of the negative impacts of their own $CO_2$ emissions, but undertake to use a certain part of their material and other resources to reduce their emissions or mitigate impacts. Members of the association can be both individuals and organisations.

At the moment, Carbonarium has 13 members, all individuals, who agreed to record their monthly energy consumption (household electricity, heating, car mileage, etc.), send it to the administrator of the programme, and pay membership fee based on their calculated $CO_2$ emissions. Carbonarium prepares statistics on its members' consumption and emission data, makes comparison between members, and also publishes some of the statistics on its website, accessible to the general public.

Based on the relevant literature, Carbonarium developed its own methodology for calculating emissions. It is fully adapted to Hungarian circumstances and data, and all members were invited to comment on it, and in the end accept it and agree to using it. The background theory for their methodology, calculation methodology as well as some specific data (e.g. the $CO_2$ emission data

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[5] For more details, see Vadovics (2009).

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of particular makes of cars) is available on their website for the public.

Members of the association (and the interested public studying their website) learnt a great deal about their $CO_2$ emissions and the most important factors contributing to the emissions. The calculations and the statistics revealed, for example, that more than half of the members' combined emissions (56%) are caused by personal mobility. Thus, members learnt about where they need to place the most emphasis on in their attempt to lead a low-carbon lifestyle. In addition, the association also organised low-carbon activities (e.g. bicycle tours) to provide space for their members to meet, socialize and support one another in their attempt to live a lower-carbon life.

The format of the association is useful for implementing voluntary programmes: it is fully democratic and gives each of the members space for expressing opinion and influencing the activities of the organisation. At the same time, because of its voluntary nature, it does not always provide the necessary structure for effective action. In the specific case of Carbonarium, none of the members had the time and capacity to design and implement a communication programme and to establish links with other organisations working in the field. For this reason, the initiative remained isolated and little known.

The initiative operates in a context that is not yet supportive and appreciative of such programmes. Generally, the population of Hungary is not yet ready to take responsibility for individual emissions on a voluntary basis. Furthermore, although some funding is available to support individuals in their attempt for a low-carbon lifestyles, it is not widely accessible. Nonetheless, with a more effective communication programme, Carbonarium might target the early adopter individuals (and organisations), convince them to join the association and offer them tools to monitor and reduce emissions. Similar initiatives to Carbonarium can also be found in the UK, most of them operating as carbon rationing action groups.[6] There, due perhaps to a more supportive environment, they appear to be growing in numbers.

### 3.4. Smart mob community: Carrotmob

Carrotmob is a virtual community that aims to reduce $CO_2$ emissions by harnessing consumer power in a particular fashion. The idea is to get a large number of consumers to show up and buy commodities as a special event, on the same day at the same place. This co-ordinated consumer power functions as the metaphorical and real currency of the event organisers, who seek businesses that agree to make socially responsible choices.[7]

In a bidding contest, different service providers are asked to give offers on how large a share of the earnings from the event they will use for investments in energy efficiency. Carrotmob makes a deal with the service provider that promises the highest percentage. The purpose is to create a win–win situation, where neither consumers nor store owners spend extra money, while still achieving energy reductions. In this form of consumer activism, consumers can make a difference by simply co-ordinating their purchases of products or services that they would buy anyway.

The Carrotmob phenomenon started in San Francisco in early 2008, where a few local activists gathered their friends and arranged a bidding contest for local liquor and grocery stores. The event was marketed through word-of-mouth and a band was asked to entertain the people queuing to the store. The event took place on a Saturday afternoon, and afterwards there was a party for all the participants. To spread the word, a movie of the event was made and shared online. The grocery store invested 22 percent of the day's sales, thousands of dollars, into energy efficiency improvements.

Two of the authors participated in a similar Carrotmob event in Helsinki, Finland, in September 2008. The idea was similar, but it was more difficult to implement in Finland due to the structure of liquor and grocery stores. Because almost all grocery stores are chain stores, the bidding contest was modified for local conditions. Instead, the Helsinki organisers chose to approach restaurants, and the event was organised on a Saturday evening in a restaurant. The second event was arranged soon after in another town, and at the time of writing there are nine regional Carrotmob groups planning more events.

Carrotmob explicitly reverses the conventional notion of 'sustainable consumption' as a sacrifice for the common good. Rather, consumers are mobilized to make use of the profit motive of companies by favouring the company willing to make the largest 'sacrifice' (which in the case of energy efficiency investments is not actually a sacrifice but a reallocation of resources). Moreover, by co-ordinating the actions of individual consumers, it enables consumers to accomplish a change in the way the company behaves and to see the results of their action.

Carrotmob's co-ordinating function alleviates the feeling of helplessness that individual consumers might feel. Making responsible consumer choices together is enjoyable and creates a feeling of togetherness, as well as the possibility to make a visible difference in a selected target. Co-ordinating purchases challenges the social conventions of shopping for one household and makes shopping a social event. The co-ordinated event targets the socio-technical infrastructures that need to change in order to reduce energy consumption. However, the extent to which the 'targets' (i.e. liquor stores, restaurants) can change their own infrastructures depends on the competencies and supply chains that they and the Carrotmob team can mobilize to save energy. Until now, the funds raised in Carrotmob events have been used for established technologies like energy-saving lighting, and the total amount of energy saved is still small.

Carrotmob also utilises new technologies to create a new infrastructure of 'co-ordinated consumption'. Social media applications have a particular role in the Carrotmob phenomenon. The original video was shared on Vimeo, and in Finland the Helsinki team started with a Facebook-group, a wordpress blog, and a wiki-site. At the time of writing, the regional Carrotmob groups use a Jaiku channel, a room on FriendFeed, as well as Ning, a new online service to create, customize, and share a social network. These viral forms of communication[3] are central in opinion sharing, recruitment, event co-ordination, experience reports, and keeping up momentum between the events.

## 4. Strengths and weaknesses of various forms of low-carbon communities

The communities described above operate on different scales, ranging Greater Manchester Area (with 2.5 million inhabitants) to the 13 members of the Carbonarium group. They also have different levels of ambition vis-à-vis low-carbon lifestyles: Green Office focuses on simple solutions that save money and reduce carbon emissions. Carrotmob at present focuses on demonstrating consumer power by promoting energy efficiency investments in individual businesses. Carbonarium, on the other hand, strives at fundamental change in consumers' carbon footprints, whereas the Manchester area aims to the forefront of climate change action in the UK. Even though these communities operate on different

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[6] See, for example, http://www.carbonrationing.org.uk/groups?&country=uk.
[7] For more details, see Carrotmob in Online database of European Demand-Side Programmes, available online at: http://www.energychange.ceu.hu.

scales, they share the aim to reduce carbon emissions, and they work towards this aim by changing the conditions for individual behaviour.

In the following, we first examine what approaches the different communities use to deal with the constraints on individual behaviour change: social dilemmas, social conventions, lack of infrastructure and helplessness. We then suggest some structural features of these communities that condition their ability to solve common problems of their members.

All of the examined communities serve to reframe the *social dilemmas* of low-carbon lifestyles, to a greater or lesser extent (Table 1). In this, they make use of two distinct approaches, even though some of the communities employ both strategies. One is to focus on win–win solutions that are outside the conventional 'win–lose' game of common resource management (e.g. Porter and Kramer, 2006), i.e. by stressing the financial and social rewards for climate actions (see also Middlemiss, 2008). This approach is dominant in the Green Office example, where the focus is on win–win solutions, and certification and stakeholder loyalty promote the financial success of the participating offices. The link to win–win solutions is also present in the MiMP case, where private benefits and the benefits for urban regeneration are stressed. Carrotmob also reframes the social dilemma from sacrifice to pleasure by enabling consumers to 'painlessly' encourage companies to invest in energy efficiency.

But some of the communities also strive for reframing the social dilemma on a more fundamental level by turning the individual's win–lose dilemma into an 'assurance game' (Kollock, 1998), where members can be assured that others will participate. The MiMP Pledge Campaign involves an important element of assurance, as residents can see that many others have signed up to the pledge. On a smaller scale, a similar effect is created in the

case of Carbonarium through membership and common monitoring, and in the case of Carrotmob, by the mobilization of consumers to be visibly present to each other at the events.

There are also two distinct ways in which the communities tackle the *social conventions* that constrain individuals in shifting to a low-carbon lifestyle. One is to deal with the conventions 'head on' by challenging existing routines and 'standard procedures' (cf. Middlemiss, 2008). This is the approach taken by Green Office and Carbonarium. Green Office deals with conventions by actively reshaping 'appropriate' procedures and patterns (e.g. paper use) in office work. Carbonarium strives for a more fundamental type of challenging by debating and challenging the taken-for-granted beliefs about modern life of its members and audiences. Another approach is to try to create new conventions. This can be accomplished, for example, by shaping the public image of climate action by making it more mainstream and entertaining, as the MiMP programme is doing. Fun is a crucial element also in Carrotmob, but it also attempts to actually create a new convention by turning (some kinds of) consumption from individual into collective and co-ordinated activities.

The communities in our examples deal with the lack of appropriate infrastructures in various ways. Mostly, they have created new knowledge networks and communication infrastructures to support new consumption patterns. None of the communities in our examples have yet managed to significantly change the 'hard infrastructure' conditioning the carbon intensity of our lifestyles. MiMP is the best positioned to actually reshape and create urban infrastructures, but as it has a legacy of existing infrastructure, change in a large urban area is a slow process. Thus, most of the infrastructure created until now is still on the drawing board. Green Office and Carbonarium, as well, have mainly focused on knowledge infrastructures, and still lack the

**Table 1**
Approaches used by the communities to deal with constraints on individual action.

| | MiMP | Green Office | Carbonarium | Carrotmob |
|---|---|---|---|---|
| Social dilemmas | Win–win solutions and assurance<br>• Identification of climate change as a common problem with tangible benefits for those taking action<br>• Links between climate action and urban regeneration | Win–win solutions<br>• Focus on simple solutions that save money<br>• Social rewards and stakeholder loyalty for 'good' workplaces | Assurance<br>• Creating a community of individuals prepared to change their lifestyle and promote these changes to others | Win–win solutions and assurance<br>• Turning climate action from sacrifice to fun<br>• Visible presence of others at events |
| Social conventions | Creating new conventions<br><br>• Taking action on climate change is simple, cool and sexy<br>• Conventions of urban life yet to be challenged | Challenging existing conventions<br><br>• Challenging and changing taken-for-granted practices at the workplace | Challenging existing conventions<br><br>• Creates a supportive environment for problematising current lifestyles<br>• Changing taken-for-granted beliefs about modern life | Challenging existing conventions and creating new ones<br>• Challenging the conventional way of consuming by making it a collective event |
| Lack of infrastructure | Communication infrastructure<br><br>'Hard' infrastructure development underway | Creation of new supply and knowledge networks<br><br>Limited impact on 'hard' infrastructure | Creating knowledge network on the carbon intensity of lifestyles<br>No impact on 'hard' infrastructure | Creates a new infrastructure for coordinating consumption<br><br>Limited impact on 'hard' infrastructures of energy use |
| Helplessness | Demonstration of progress on wider MiMP programme<br>Demonstration that other pledgees are taking action | Advice, support, new competencies<br>Alignment of individual and organizational motives | Advice and encouragement<br><br>Members can see that "others doing their bit" | Participation and togetherness at Carrotmob events<br>Small but visible results |

'reach' and power to reshape global supply chains. Interestingly, Carrotmob has created new infrastructure to co-ordinate consumer action via Internet and mobile communications.

While the communities have experienced varying success in dealing with the above-mentioned constrains on individual behaviour change, they all appear to be making progress in dealing with helplessness. They do so by providing advice, encouragement and new competencies, as well as a legitimate context for action (cf. Middlemiss, 2008). The communities also empower by demonstrating in various ways that there are others who share the same concern (as in Carbonarium), and are taking the same actions. This can include members of the same community, but also others within the region, as in the case of Manchester is My Planet.

It was previously also suggested, following Jackson (2005), that the structure of communities can make a difference for their ability to create conditions for sustainable consumption. In "high-grid" communities, the rules governing social relations are clearly defined, and there is a clear division of labour within the community. On the other hand, "high group" refers to a structure in which the boundary between the community and the outside is distinct and group members share strong personal and emotional ties. We examine how these different features of our four communities influence their ability to support individuals in the adoption of low-carbon lifestyles.

Considering the four different community types, we find that the urban community (MiMP) and sector-based community (Green Office) correspond roughly to a "high-grid" structure: relations between members are governed by distinct rules and there is a clear division of labour. These are strengths enabling the enforcement of common principles and the distribution of rewards. But they may also be relative weaknesses in terms of empowerment and participation. People expect extrinsic rewards and sanctions in high-grid communities, and it is more difficult to create intrinsic value of group membership in this type of context. We thus characterize MiMP as 'medium' on the group dimension, also due to its sheer size, in spite of its active work in social mobilization. Green Office can be characterized as 'low-to-medium' on the 'group' dimension because of the fundamentally transactional nature of relations within the network, in spite of the friendly personal relations that have evolved.

NGOs and informal groups are characteristically high on the 'group' dimension (Douglas and Wildavsky, 1982). Carbonarium, our interest community, and Carrotmob, our 'smart mob' community, are stronger on the 'group' than on the 'grid' axis. There is relatively little division of labour or formal structure employed to ensure appropriate forms of behaviour. In the case of Carbonarium, for example, the 'low grid' characteristic created problems: people lacked the time to work in the association to ensure that goals are met, and there were few clearly defined roles. It is likely that in this case, working towards medium in 'grid' might help achieve aims while still preserving spontaneity and egalitarianism.

'Smart mobs' are a form of community in which organised social action is based on technology mediated, emergent behaviour (Rheingold, 2005). Being (partly) virtual communities, they embody some of the characteristics of such communities: while levels of mutual support are lower than in face-to-face communities, such communities are also more egalitarian because the lack of frequent face-to-face interaction prevents the emergence of social stratification (Brint, 2001). This is the case for Carrotmob, where activities are organised on an ad hoc basis, with different people taking the lead at different times.

Effective action to combat climate change requires both structure and social mobilization. The two high-grid communities have more power to effect changes due to their more structured character. Yet on the other hand, as they build on existing structures, the have a large task in transforming those structures, which have considerable inertia embodied in existing institutions, social relations and technological systems. The two 'low-grid' communities have little existing structure to slow their pace, yet lack of concentrated power can make it more difficult for them to exert an influence outside the sphere of their membership. Moreover, like all voluntary communities, they are at the risk of 'core burnout' (Newman et al., 2008) and loss of momentum.

All of the community types discussed here have their own strengths and weaknesses. Yet each of the examples we examined serves in its own fashion to overcome obstacles to individual action. As the communities evolve and become more self-reflective, they will likely benefit from an examination of their inimical 'virtues' and 'vices' (see Brint, 2001). This may enable the communities to work toward an optimal balance between structure and individual empowerment. Moreover, these and other communities can likely benefit from creating some sort of hybrid, nested forms of community management (see Ostrom, 1990), as is to some extent the case already in the Manchester is My Planet community.

## 5. Conclusions

Without working together, individuals stand little chance of seriously reducing their carbon emissions. We have presented four ways in which people can form low-carbon communities, as identified in a review of European programmes to conserve energy and mitigate climate change. Our research suggests that low-carbon communities can centre around various shared interests, practices and structures. In addition to the primary type of community, the place-based community, we identified communities emerging around sectors, shared interests, or social media. The communities operate on different scales and through different media (established institutions, face-to-face contacts, online communications), and create and sustain their boundaries and rules in different ways.

At present, our data on different types of communities are limited. However, through one exemplary case of each type, we can suggest some particular advantages and problems in different community types. Further research is needed to establish the generalisability of these observations.

It is clear that place-based communities have inimitable advantages in providing infrastructure for more sustainable consumption patterns, yet they also bear the burden of existing infrastructures that are slow to change (see Hughes, 2001). Nonetheless, urban authorities are uniquely positioned to influence utilities, business and consumers within the region, and the Manchester is My Planet programme indicates that new modes of communication and co-operation (such as pledges) can be incorporated into an existing urban governance structure.

It is perhaps less self-evident that sector-based communities have opportunities to challenge existing conventions of work. The Green Office programme, however, shows that some conventions are fairly easy to change, once critical mass and supportive institutions are in place. Even greater strategic competencies and power are, however, required to change the 'hard infrastructure' of office work, which is often shaped by global enterprises and standards.

The conventions governing private consumption are more difficult to challenge than those at the workplace; consumption is usually a private affair and the conventions shaping consumption are more 'invisible' due to entrenched beliefs in consumer sovereignty (Sanne, 2002). Carbonarium, our interest-based community and Carrotmob, a smart mob community, show that even such conventions can be challenged on a small scale; in the

case of Carbonarium, through debate and problematisation, and in the case of Carrotmob, by creating a new forum for co-ordinated consumption. The work of these communities is still in progress, but suggests as their potential strength their ability to alleviate the helplessness that individuals feel when faced with the enormity of the climate challenge.

The different types of communities are not mutually exclusive, but overlap and complement one another. This is most visible in Manchester is My Planet, which though it is a place-based community, also hosts sub-communities centring on shared interests and practices. Our analysis thus suggests that existing and emerging low-carbon communities can evolve by hybridizing and adopting elements from other types of communities.

We also highlight the challenges that communities encounter when trying to build an amenable context for low-carbon behaviour patterns. The communities we have examined are all 'young', and have yet to bear the test of time experienced by the common resource management communities examined by Ostrom (1990). They operate in a global environment and economy where the boundaries of time and place are blurred. As carbon emissions are global, the boundaries of these communities cannot be tightly limited if they wish to reach their goals. In the case of Carbonarium, the initiative remained isolated, and thus had limited impact beyond its membership. Carrotmob is growing globally, but its ability to sustain momentum depends on continual recruitment of dedicated activists. Green Office is establishing in new countries, bringing new management challenges for an originally local certification scheme. Manchester is My Planet is active in national climate policy and co-operates with other cities. These developments show that present-day communities for the management of global problems through local solutions need to devise new rules and principles to complement traditional common-pool resource management institutions (cf. Ostrom, 1990).

We cannot suggest the best possible format and structure for low-carbon communities—this depends on the context, history and resources of each community. However, our analysis indicates some dimensions on which low-carbon communities can be evaluated, improved or supported, and which may be helpful for researchers, practitioners and policy makers in the future. We also suggest that present-day communities may need to create new principles and hybrid solutions for co-operation to complement the time-tried principles of community resource management.

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